GAS JOURNAL

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GAS-WORKS PAINTS

A POINT not generally appreciated by the public is that the gasholder is a delicate mechanism, the upkeep of which is a cause of considerable concern to gas engineers. For this reason, the application and nature of gas-works paints is a subject of considerable importance and one to which the Junior Gas Associations have been giving a good deal of attention lately. The latest Association to discuss the problems involved is the Eastern, which at a meeting at Stamford heard a paper by Mr. E. Maurice Pool, Technical Representative of the Gas Section, Donald Macpherson & Co., Ltd. There are, says Mr. Pool, no conditions more strenuous or more exacting than those encountered in gas-works, where water, sunlight, chemical fumes, and sometimes salty atmosphere rigorously test the protective coatings.

Mr. Pool adopts a commendable approach to dividing gas-works paints into those which are intended to preserve and those intended to decorate. The first classification is naturally that of greatest concern to the gas engineer who has to ensure the maximum life from the costly equipment under his control, and it is to this that Mr. Pool's paper is mainly devoted. He appears to favour the three-coat painting process —the primer applied to the bare metal, the undercoat, and the finishing coat—which is now a general standard throughout the gas industry, including two of the largest holding companies, and many engineering concerns. This is naturally more expensive than painting with fewer coats, but the cost has to be judged in relation to the cost of the equipment, not its original cost, but that of its replacement which is to-day far higher than ever before. It is amply evident from Mr. Pool's paper that paint manufacturers who specialize in protective finishes for the gas industry are well aware of the unusual conditions encountered, and are doing their best to improve their products by constant research and experiment.

The discussion, which, with the paper, will be published later in our monthly contemporary, "GAS," was no less important than the paper itself, for it enabled Mr. Pool to deal with some of the specific problems encountered by members in the course of their normal experience. The suggestion was put forward that contractors should be paid on the basis of continuous protection rather than for a specified number of coats of paint—an arrangement which was said to have worked well in the case of the Great Western Railway in respect of certain of its bridges. Relative costs and merits of spray and brush painting came in for considerable discussion. Attention was also directed to the development of infra red drying and the special position of the gas industry in regard to ensuring the use of the right types of paint, as well as the right drying process, in connexion with mass-production methods. In this field there is scope for co-operative research in which paint manufacturers, appliance makers, and gas engineers should have equal share.

HALF-WAY HOUSE

THE British Iron and Steel Federation in 1945 drew up a plan for the long-term development of the steel industry which was given the Government's general approval in May, 1946. To-day, the Federation can report that the programme has reached the half-way house. Over two-thirds of the total expenditure involved under the plan has now been approved in detail by the Iron and Steel Board and construction on half the schemes at least is in hand. The plan is linked with the picture presented in the British reconstruction report recently submitted to the Organization for European Economic Co-operation.

The December issue of the Federation's monthly *Statistical Digest* says that the plan was already giving benefits and had been successfully adjusted to meet changing assessments of the country's needs. There had been no difficulty in reaching agreement between the Government and the industry in making these changes and in seeing to the energetic carrying out of the practical steps necessary. Indeed, the bulletin comments, the whole steel development plan was an outstanding example of the possibilities of broad public supervision of planning and, within this framework, the responsible carrying out of development under private enterprise.

Then the report turns to the Iron and Steel Bill, which it claims has caused some difficulties in operating the development plan. It is, of course, too early to say what the effects of the Bill on development might be, but it has increased the difficulty of raising capital. Some of the companies concerned, although not short of cash, would need to enter into commitments before May 1, 1950, for sums far in excess of their present resources, and would, in normal circumstances have been securing the additional capital at the appropriate time. This difficulty has been particularly felt in raising a substantial proportion of the funds needed by the issue of Ordinary shares. The segregation of parts of companies has impinged on development, too, but in fairness the Federation points out that if segregation was not carried through where economically practicable, the State would become involved in developing many industries far beyond the bounds of iron and steel.

Similar difficulties arose out of the liability of directors for any use of assets or other expenditures which the Minister or corporation might at some later date decide was not in the interests of the Corporation. Particular problems faced the firms in the finishing branches of the industry which would be competing with State companies on a "quite indeterminable basis" and limits were placed on the expansion of small firms because growth to over the 20,000 tons a year limit, as was involved in their plans, would make them liable to acquisition by the steel corporation.

The bulletin surveys the ground still to be covered and points out that the raw material factor which seemed most

likely to limit output was the supply of coke. Coke consumption per ton of iron has fallen and is expected to decline still further, but there is still a need for another mill. tons of coke which in turn involves a further 5 mill. tons of coking coal. The main expansion of coke oven capacity has been taking place at the iron and steel works, orders for the plant needed have largely been placed, and work is proceeding. Nevertheless, the time taken to build coke ovens is so long that there may be difficulties in supply, particularly between 1949 and 1953 when extra blast furnaces will be coming into operation.

Behind this question of coke oven capacity is the need for adequate quantities of good quality coking coal, a problem which is out of the hands of the Federation and to which no solution has yet been offered by the National Coal Board.

HEATING INSIDE THE INDUSTRY

IT is a curious fact that while so much has been written and said concerning other people's problems of heating and hot water supply there has been little comparable discussion of the gas industry's own problems in this direction—within the industry. With so much heat in different forms readily available, there is no excuse for poorly heated staff rooms or for an inefficient supply system of hot water on a gas-works. It is well known what a difference warm washing and changing rooms on a works can make to the people employed there, with a consequent improvement in morale and the quality of the work.

Mr. W. F. Moore, Heating Engineer and Assistant Industrial Engineer, Wandsworth and District Gas Company, has done a good deal to remedy the lack of literature on this subject, and incidentally has shown what excellent steps have been taken by his Company to provide warmth and hot water on their works, in a paper "Some Problems of Heating and Hot Water Supply within the Gas Industry," which he read to a meeting of the London and Southern Junior Gas Association on Jan. 14, and which will be published in full in a subsequent issue of "GAS."

Mr. Moore divides his paper into three main parts, discussing heating on the works, near the works, and away from the works in showrooms and the like. In the first section he describes an interesting programme carried out by the Wandsworth undertaking in improving washing and changing facilities in stokers' lobbies. Improvements have been proceeding since the end of the war, but as new buildings, which are desirable so that the heating system and the structure can be designed together, were out of the question, existing buildings had to be converted. How provision was made for an ample supply of hot water, warm surroundings for changing and washing, lockers, means of drying clothes, and for a warm rest or meal room is described in detail by Mr. Moore, who says that steam is used for all these purposes on all the Wandsworth Company's stations. Hot water supply is by calorifier, and either warm, filtered, mechanically introduced air or hot water central heating have been used for space heating.

The author's next section consists of a brief note on heating near the works and he recommends partial air conditioning for all office buildings and the like which are in the all-pervading atmosphere of the works area. In his section on heating away from the works, he makes a number of highly interesting recommendations on the heating and air conditioning of showrooms which, if applied, could only serve to improve the industry's already largely admirable sales and display quarters.

Many of the problems discussed in Mr. Moore's paper are general throughout the industry and, as he says, many of them have to be dealt with in their own way by works engineers who cannot be expected to have had a very wide experience in this specialized branch of engineering and who, in any case, have other primary duties and responsibilities. For this reason Mr. Moore's paper is to be welcomed, and it may be hoped that by leading the industry to improving its works facilities it will be helped to set an example to others.

THE GAS FUND

In the Gas Fund (Contribution) Order, 1949, dated Jan. 11 (Statutory Instruments, 1949, No. 30), the Minister of Fuel and Power, in pursuance of Section 7 of the Gas Regulation Act, 1920, as amended by the Gas Undertakings Act, 1934, prescribes that the rate of contribution to the Gas Fund for the year 1949 shall be: (a) two pence (against 8d. in 1948) for each 5,000 therms in the form of gas sold during 1948, excluding gas sold to other undertakers in bulk for distribution and gas supplied separately for industrial purposes only; and (b) one penny (against 4d. in 1948) for each 5,000 therms in the form of gas supplied separately for industrial purposes only during 1948. The contribution, due on or before April 1, is payable to the Minister at Heyhouses Lane, Lytham St. Annes, Lancashire, by all gas undertakers with respect to whom an Order under the Act shall have been made or to whom sub-section 3 of Section 7 of the Act applies by virtue of any public general Act, special Act, or Special Order.

REFRACTORY BRICKS

A Working Party of the United Nations Economic Commission for Europe, consisting of representatives of Britain, the U.S.A., Austria, Belgium, Czechoslovakia, France, Sweden, and Switzerland, has been looking into the possibilities of exploiting natural resources in Europe to improve supplies of refractory materials. The Working Party found that last year's production of silica bricks would be approximately 26% above that of 1947. Regarding future developments, it is intended that the raw materials should come from Central and Eastern Europe, the countries of Western Europe acting as suppliers of mining and quarrying machinery and equipment. It was too early for the Working Party to make a final statement about the supplies and requirements of 1949, but it is believed that a moderate increase in production would be sufficient on condition that requirements are accurately known and that joint action is taken by the producing countries to satisfy them. The Working Party was interested in the possibilities of developing production in Austria and Czechoslovakia of magnesite and chrome-magnesite bricks, and of burnt magnesite. A group of experts is to study this question and the magnesite resources of Yugoslavia are to be investigated. Concern was expressed at the low rates of quartzite production in the French zone of Germany, a major exporter of high quality material. German industry can produce the necessary trucks and tractors provided orders were placed in accordance with the usual commercial procedure, and representatives of the joint British-American zone are to make the necessary arrangements with those of the French zone regarding railway material for mines and quarries, which has been described as one of the major obstacles.

UP AND DOWN

Although Lord Hyndley has not lost hope in the possibility of 1949 being a successful coal production year, figures which have just been announced—on the same day—for coal and steel production are such as to delight opponents of nationalization and to give further food for deep thought to its supporters. Although December's figures for steel output were adversely affected by the Christmas holidays, output by the industry in 1948 reached 14,877,000 tons, thus easily beating the Government's increased target of 14,500,000 tons set in May. The target was not, of course, sufficient to meet all the nation's needs for either home or export, as we pointed out in these columns some time ago, but as the highest figure yet attained the achievement is a memorable one. When the original target of 14,000,000 tons was set in January, 1948, the Government felt it to be barely attainable. The previous best output was in 1939 when 13,222,000 tons were produced. The year was rounded off by a record December: every month except July showed a record production, aided by an outstandingly successful home scrap campaign. Home-purchased scrap last year yielded 4,550,000 tons, or 850,000 tons more than was forecast in the Economic Survey. With such an achievement behind it, it seems unlikely that anything but shortage of raw material supplies can hold back the steel industry from another record year—always assuming that it is left to get on

with the job without a structural upheaval caused by Government interference.

Coal output, on the other hand, has started the new year badly. A drop in production is always expected in January after the pre-Christmas boost, but with its past year's failure lying heavily on its shoulders the N.C.B. cannot afford to treat lightly the interim figures just announced. Compared with the first week of 1948, production was down by 365,900 tons (317,600 less from deep-mined and 48,300 less from opencast). Most of this loss was due to the continuation of recognized holidays in Scotland and the northern region because Jan. 1 was a Saturday, yet there was a big loss apart from the 341,600 tons due to this cause. Only in the North Midlands was there a large increase. The Ministry of Fuel and Power has issued with its coal statistics information on inland consumption of coal. The gas industry has used 8.08% more coal in 1948 than 1947, bringing the amount to 24,519,000 tons. Coke ovens took 22,186,000 tons, or 12.15% more. Gas made available during the year was 505,369.3 mill. cu.ft. compared with 484,469.4 in 1947. There has been a comparable increase in electricity generated and sent out for public supply of 9.2%.

Personal

Mr. R. K. MORTIMER has been appointed Secretary of the March Gas and Coke Company, following the recent retirement of Mr. C. Greenwood. Mr. Mortimer has been manager of the Company for many years.

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Dr. F. A. Fox has relinquished his appointment as Deputy Director of the British Welding Research Association and is joining Messrs. H. J. Enthoven and Sons, Ltd., as Deputy Technical Manager. His new address will be 15, Lime Street, E.C.3.

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Mr. CHARLES SMITH has been appointed a Local Director of John Smith (Keighley), Ltd., the Yorkshire crane makers. A grandson of John Smith, the founder of the firm, established in 1866, Mr. Smith has been with the Company more than 30 years.

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Following the appointment of Mr. E. M. Edwards as full time member of the Wales Area Gas Board, Mr. W. D. REES, deputy Engineer and Manager, has been appointed Acting Engineer and Manager of the Port Talbot Gas Department from Jan. 27.

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Dr. H. K. WHALLEY, Ph.D., Head of the Chemical Research Department of Manchester Oil Refinery Ltd., is joining Petrocarbon, Ltd., to be in charge of programme and planning of Petrochemicals, Ltd. For the last four years he has been engaged in directing an intensive research programme and has made a particular study of the application of petroleum-derived chemicals, achieving outstanding results in the development of petroleum sulphates. Dr. Whalley, a scholar of Pembroke College, Cambridge, graduated with double first-class honours in 1929, and obtained his Ph.D. Degree in 1932. Late in the same year he was appointed to the Government Chemist's Department. During the early phases of the war he was seconded to the headquarters scientific staff of the Ministry of Supply and, as Assistant Director of Chemical Research and Development—in the Department of the Controller of Chemical Research and Development—he was concerned with the initiation, progression, and co-ordination of general chemical research.

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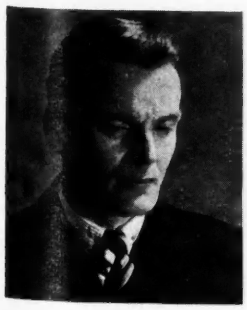
Mr. E. W. BENTON, M.Sc., has been appointed Technical Officer to Sidney Flavel & Co., Ltd., as from January 1. Following his graduation from Birmingham University, Mr. Benton served under Dr. Harold Hartley in the Central Laboratories of Radiation, Ltd. From 1928 to 1948 (with the exception of the war years), he occupied the position of Chief Chemist to Cannon Ironfoundries, Ltd. During the war he worked for the Admiralty as a Senior Experimental Officer in the Anti-Submarine Experimental Establishment. He has served on committees of the Institute of Gas Engineers and British Standards Institute and has given a number of papers to the Junior Gas Associations and Salesmen's Circles.



Mr. W. ARNOLD JACKSON, Chairman and Managing Director of Sidney Flavel & Co., Ltd., is seriously ill and is not expected to return to business for some time. Any personal messages should be addressed to: Newlands Nursing Home, Chorley New Road, Bolton, Lancs.

As reported last week, Mr. TOM BROWN, M.Comm., F.C.W.A., F.I.I.A., F.S.S., has been appointed a part-time member of the South Eastern Gas Board. His many friends in the industry will be sorry to hear that following an illness in the middle of last year it became necessary for him, on medical advice, to give up full-time executive work. After attending Birmingham University, where he took a First Class Honours Degree in Commerce, he acquired a wide business experience in banking as Secretary and Commercial Manager to a large rubber manufacturing concern, and in the steel industry where, as a member of a Government committee, he visited the principal European countries in the late 'twenties to investigate and study conditions in the steel trade; he has also travelled extensively in the U.S.A. and Canada both before the war and recently. Mr. Brown is a Fellow of the Institute of Cost Accountants, a Fellow of the Institute of Industrial Administration and a Member of the Royal Statistical Society and of the Royal Economic Society. He entered the gas industry in 1930 to deal with problems then arising out of mechanized accounting in the South Metropolitan Gas Company. Later he was invited to join the South Suburban Gas Company, of which undertaking he is now a Managing Director. During his service with the South Suburban Company it has seen considerable development and has attained a strong financial position. Mr. Brown is also a Director of the South Eastern Tar Distillers and Johnson Bros. (Aylesford), Ltd. He was a member of the Organization Committee leading up to the formation of the British Gas Council of which he has been a member of the Central Board and an elected member of the Executive Committee since its formation. He is Chairman of the Finance Committee, the Domestic Development Committee, the Joint Consultative Committee with the S.B.G.I. and a member of the Publicity Committee. He has been at the head of the Domestic Development Committee since its formation as the Domestic Heat Services Committee of the British Gas Federation, and high appreciation has been expressed of its work, particularly with regard to the many difficult post-war problems which have arisen in connexion with supplies to domestic premises on the commercial and supply sides. Mr. Brown is also an elected member of the Central Committee of the Federation of Gas Employers and Chairman of the Finance and Staff Committees of that body, and a member of the National Joint Council for Gas Staffs and its Executive Committee. Mr. Brown served in France in the early days of the 1914-18 war and was invalided out in 1916. He is one of the outstanding men of the gas industry and it is very fortunate that in the new set-up his knowledge and experience will still be at the service of the industry in his capacity as a part-time member of the South-Eastern Gas Board.

GAS BOARD APPOINTMENTS

The Minister of Fuel and Power has appointed Mr. R. S. JOHNSON, M.B.E., M.A., LL.B., as Deputy Chairman of the South-Eastern Gas Board. Mr. Johnson is Solicitor and Controller of Services for the Gas Light and Coke Company. He was educated at the Stationers' Company School and at Gonvilles and Caius College, Cambridge. He was articled for three years on leaving Cambridge and was admitted solicitor in 1930, after which he did five years in private practice. Mr. Johnson entered the Gas Light and Coke Company in 1935 as Assistant Solicitor, was appointed Deputy Secretary and Solicitor in 1946, and early in 1947 became Controller of Services and Solicitor. He served in the Royal Artillery during the war and saw service in the Middle East, Sicily and Italy, as a Lieut.-Colonel. Mr. Johnson is married and has two children; he is 42 years old.

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Mr. EDWARD C. WOODALL who, as briefly announced last week, has been appointed a member of the Eastern Area Gas Board, was born in 1903 and educated at Eton and Christ Church, Oxford. He was called to the bar in 1928, and practised at Common Law and Parliamentary Bars. He served in the R.A. from 1939 to 1945, and was Staff Captain (A) in the 1st Corps D.A.A.G., 21 Army Group, and later A.A.G. and Colonel (not Lieut.-Colonel) (A) at S.H.A.E.F. He was awarded the O.B.E., the Bronze Star (U.S.A.), the Legion de Honneur (Chevalier), and the Croix de Guerre. He is Chairman and Managing Director of the Tottenham and District Gas Company, Chairman of the Barbados Gas Company, Danish Gas Company, and Houghton-le-Spring District Gas Company; and a Director of the Aberystwyth Gas Company, the British Gas Light Company, and the South African Lighting Association.

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In the House of Commons on Jan. 20, Mr. A. M. Skeffington (Lewisham, W.) asked the Minister of Fuel and Power when the Gas Consumers' Council for the South-Eastern Area would be appointed, and whether appropriate bodies had been approached in the matter of the personnel of the Council. Mr. Gaitskell replied that nominations had been invited from all appropriate bodies and associations. They had not yet received all their replies, and he could not say precisely when the Council would be appointed.

Obituary

Mr. JOHN WILLIAM RADBURNE, a Director of the Rushden and District Gas Company for many years, died in Northampton General Hospital on Jan. 15. He was 70 years of age.

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Mr. EDWARD JAMES CLOSE, Chairman, Manager, and Secretary of the Wotton-under-Edge & District Gas Company, had just been re-elected to the chairmanship of the Wotton-under-Edge magistrates when he had a heart attack and died in the court room. Mr. Close joined the Board of the Company almost 40 years ago and took over the duties of Manager and Secretary in 1914. Aged 73, Mr. Close was still actively interested in public work, was a County Councillor, and a member of Dursley R.D.C., of which he was Chairman during the war. He was also Chairman of the Wotton-under-Edge Parish Council. Mr. Close was also a Director of the Dursley, Malmesbury, and Berkeley gas companies. During his management of the Wotton-under-Edge Company, sales rose from 4 mill. cu.ft. to 36 mill. cu.ft. a year.

Diary

Jan 29.—**Western Junior Gas Association:** "Mechanized Accounting—Some Methods Operated at Torquay," G. Sherlock, F.L.A.A., A.C.I.S. (Chief Accountant, Torquay and Paignton Gas Company). At Bridgwater.

Jan. 31.—**Women's Gas Council:** Finance and Emergency Committee. Gas Industry House, 12.30 p.m.

Feb. 3.—**Solid Smokeless Fuels Federation:** Executive Committee, 11.30 a.m., Dorchester Hotel, Park Lane, W.1.

Feb. 3.—**Midland Junior Gas Association:** Day visit to the works of the Redditch Gas Company, the Enfield Cycle Company, and the British Cast Iron Research Association. Redditch Gas-Works, 11 a.m.; Foxlydiate Hotel, Redditch, for lunch, 1 p.m.; Works visits. 3 p.m.

Feb. 4.—**Junior Institution of Engineers:** "Mechanical Handling," W. G. Picton, M.Inst.F., and N. A. Jenkinson, 39, Victoria Street, S.W.1. 6.30 p.m.

Feb. 8.—**National Federation of Gas Coke Associations:** General Committee. Gas Industry House, 10 a.m.

Feb. 8.—**Federation of Gas Employers,** Central Committee, Gas Industry House, 11.30 a.m.

Feb. 8.—**British Gas Council:** Central Board, Gas Industry House, 2.30 p.m.

Feb. 9.—**London and Southern Junior Gas Association:** "An Industrial and Commercial Gas Sales Organization," T. V. Garrud, A.M.Inst.Gas E. (Gas Light and Coke Company), Gas Industry House, 2.30 p.m.

Feb. 9.—**Scottish Junior Gas Association (Eastern District):** Visit to the Works of Collvilles, Ltd., Motherwell.

Feb. 11.—**Scottish Junior Gas Association (Western District):** Short Paper Day.

Feb. 14.—**Women's Gas Council:** "The Child in the Home," Dr. Leslie Housden. Gas Industry House, 3 p.m.

Feb. 14-15.—**Women's Gas Council:** Branch Secretaries' Conference. Gas Industry House.

Feb. 15.—**Chemical Engineering Group (Society of Chemical Industry):** "Technical Education," Prof. T. R. C. Fox, M.A., M.I.Mech.E., M.I.Chem.E. Geological Society, Burlington House, Piccadilly, W.1. 5.30 p.m.

Feb. 16.—**Manchester District Junior Association of Gas Engineers:** Visit to the works of R. and J. Dempster, Ltd. "Some Aspects of Gas Development." A. J. Leather (Blackburn).

Feb. 19.—**Yorkshire Junior Gas Association:** Paper by B. Thorpe, M.Inst.Gas E., M.Inst.F. (Sheffield), Sheffield.

Feb. 22.—**Wales and Monmouthshire Junior Gas Association:** Visit to New Works, Pontypool.

Feb. 22.—**Midland Junior Gas Association:** Students' meeting. Visit to Coventry Gas Department.

Feb. 23.—**London and Southern Junior Gas Association:** Visit to the Chiswick Works of the London Transport Executive.

Feb. 23.—**Western Junior Gas Association:** Visit to the Van Heusen Works, Taunton. "Works Planning." F. S. Hickin (Taunton).

Feb. 24.—**Scottish Junior Gas Association (Western District):** Visit to G. and J. Weir, Ltd., Cathcart.

Feb. 24.—**Institution of Chemical Engineers** (Joint Meeting with Low Temperature Group of the Physical Society): "Materials of Construction for Use at Low Temperatures," E. W. Colbeck. Geological Society, Burlington House, Piccadilly, W.1. 5.30 p.m.

Mar. 9.—**B.G.C. Domestic Development Committee,** Gas Industry House, 2.30 p.m.

INSTITUTION EDUCATION SCHEME

Supplementary List of Examination Results, 1948

EXTERNAL CANDIDATES (6)

Higher Grade Certificate in Gas Engineering (Manufacture) 3)

Class	Name	Town
Second	Evans, K. M.	Redditch
"	Harvey, G. W.	Bristol
"	Jones, L. R.	Bristol

Ordinary Grade Certificate in Gas Engineering (Manufacture) (1)

Class	Name	Town
Second	Hemmons, L. J.	Bristol

Ordinary Grade Certificate in Gas Engineering (Supply) (2)

Class	Name	Town
First*	Edwards, W. J.	Oxford
Second	Brock, B. W. S.	Plymouth

* Previously reported Second Class in error.

INTERNAL CANDIDATES (33)

Higher Grade Certificate in Gas Engineering (Manufacture) (6)

Class	Name	Centre
Second	Finnigan, J. R.	Bradford
"	Glover, J.	Manchester
"	Harris, J. A. T.	Leicester
"	Millington, J.	Manchester
"	Thomas, J.	Birmingham
"	Williams, A. E.	Birmingham

Ordinary Grade Certificate in Gas Engineering (Manufacture) (2)

Class	Name	Centre
Second	Sidebotham, J.	Manchester
"	Trawford, B.	Birmingham

Higher Grade Certificate in Gas Engineering (Supply) (3)

Class	Name	Centre
First	Buckham, S. G.	Brighton
Second	Blackburn, H.	Birmingham
"	Dibble, A. S.	Westminster

Ordinary Grade Certificate in Gas Engineering (Supply) (1)

Class	Name	Centre
Second	Stuart, B. J.	Southend-on-Sea

Results of Supplementary Examinations held in October, 1948, for Internal Students attending Intensive Full-time Courses:

Ordinary Grade Certificate in Gas Engineering (Manufacture) (9),

Class	Name	Centre
First	Danton, S. A.	Westminster
Second	Alexander, E. P.	Westminster
"	Beattie, C. W.	Westminster
"	Cam, G. W. A.	Westminster
"	Chesworth, J.	Westminster
"	Clutterbuck, L.	Westminster
"	Fry, C. V.	Westminster
"	Heywood, D.	Westminster
"	Humby, A. J.	Westminster

Ordinary Grade Certificate in Gas Engineering (Supply) (12)

Class	Name	Centre
First	Pratt, R.	Westminster
"	Burchell, D. H. F.	Westminster
Second	Bainbridge, W.	Westminster
"	Barrett, J. C.	Westminster
"	Brunt, J.	Westminster
"	Clayson, J. A.	Westminster
"	Gunning, R. C.	Westminster
"	Hanson, S.	Westminster
"	Moule, E. S.	Westminster
"	Sadler, A.	Westminster
"	Sadler, A. J. D.	Westminster
"	Spivey, R.	Westminster

COVENTRY MAIN EXTENSION

Coventry Gas Department's new gas supply to the Keresley district has been inaugurated by Alderman J. Howat, Chairman of the Coventry Gas Committee. Keresley is a village some four miles from Coventry and providing its inhabitants with gas has involved laying 4½ miles of main at a cost of approximately £15,000. Work is now in progress on connecting services to the first 78 consumers.

At the inauguration ceremony, in the presence of representatives of the Department, of the Meriden R.D.C., and Keresley Parish Council, Alderman Howat said that the new supply would be of great assistance to the parish, particularly to colliers and their wives.

Extension of the mains was first considered in April, 1947, and came as a result of representations from the villages who sent a petition to the Gas Committee. A survey of the area was carried out and it was found that out of 245 residents, 209 wanted a gas service. More requests for gas are still being received from the village and, says Mr. J. E. Wakeford, Engineer and Manager, the extension promises to be one of the most attractive undertaken by the Department.

Tenders are being invited by Middlesbrough Town Council for the laying of nearly 4,000 yd. of iron gas main from Spencer Beck, Middlesbrough, to Wilson. The work will be started about June.

GAS SUPPLIES IN SOUTH WALES

The Minister of Fuel and Power, Mr. Hugh Gaitskell, accompanied by Mr. Alfred Robens, Parliamentary Secretary, received a deputation last week, representing the Urban District Councils of Abercarn, Nantyglo and Blaina, and Brynmawr, areas in South Wales which have been seriously affected by the failure of gas supplies from the coke ovens at Blaenavon. The delegation was introduced by Mr. D. Granville West, M.P. for the Pontypool Division in the absence through illness of Mr. George Daggar, M.P., and Mr. Tudor Watkins, M.P.

Colonel H. C. Smith, Deputy Chairman of the Gas Council, indicated that he and the Chairman, Mr. A. E. Sylvester, had been to South Wales investigating the position and with the Chairman of the Wales Gas Board, Mr. Mervyn Jones, had held discussions on the spot with local experts in the gas industry. As a result of this, special arrangements had been made to engage as an expert consultant Mr. W. Hodkinson, General Manager of the United Kingdom Gas Corporation, to make a complete technical survey. Mr. Hodkinson has visited the sites of the gas undertakings and inspected the distribution system generally in both valleys. He is surveying the whole position with a view to reporting on what emergency steps could be taken to improve the situation.

Colonel Smith and Mr. Mervyn Jones gave an undertaking that the report when received would have immediate attention.

Mr. J. W. Davies, Senior Regional Officer of the Ministry of Fuel and Power for Wales, submitted figures for the total supply of gas in the area from existing plant in Pontypool and Blaenavon coke ovens which indicated that it was inevitable that in the immediate future there would be a deficiency in gas supplies in the eastern and western valleys of Monmouthshire. This will involve some form of rationing scheme and the claims of domestic and industrial consumers in both valleys will have to be balanced.

The Minister indicated his personal concern at the discomfort and inconvenience that the shortage of gas is causing for lighting and cooking and gave an assurance that he will do everything possible to alleviate this state of affairs.

The Minister said he regarded the present situation as one of immediate emergency. He undertook to contact the Ministry of Food and other authorities to do what is possible by the use of mobile canteens or any other method to relieve the immediate hardship from which the people are suffering. He also undertook to contact the British Electricity Authority in an endeavour to speed up the provision of electricity for lighting.

COKE FOR HEAT STORAGE COOKERS

Up-to-date notes on the use of coke in place of anthracite and dry steam coal in heat storage cookers have been issued by the London and Counties Coke Association. Coke can be used without difficulty in heat storage cookers, one of the principal types of which is designed for use with coke. A different method of handling must, however, be adopted from that used with anthracite or coal.

Wherever possible the size of coke recommended by the maker should be used, which, in the case of the Aga cooker, is 1 in.—1½ in. Experience has shown that the following sizes of gas coke give satisfaction: Broken coke 1 in.—2 in. for cookers of larger size, coke nuts ½ in.—1¼ in. for small cookers. Oversize and undersize pieces should not exceed 5% to obtain most satisfactory working results. When the correct size is used, the fire should burn continuously, allowing at least 10 hours' "banking" or overnight period. The firebox should be filled with coke. To light the fire, a gas poker should be used where possible.

In the case of hand-fired and hand-operated damper control, the maker's instructions supplied with the cooker should be followed to obtain the required heats—for hot plate cooking, baking, and for hot water. Generally the firebed depth should not be allowed to drop below 6 in. The thicker the fire the slower it will burn through; therefore, if quick recovery is required fuel should be added "little and often."

The fire should be cleaned or riddled two or three times daily to remove ash or pieces of shale. Cleaning should always be carried out when dampers are opened to increase heat output. The fire should be refuelled after cleaning according to the recommendations of the makers.

The ashpan should be emptied at least once a day, but more often if required. Dampers, fire doors, fuel plugs, or lids must be kept free from dust or grit with a wire brush to ensure easy and correct working. Flues to oven, boiler and chimney should be cleaned once a month to ensure free passage to hot and waste gases.

In self-feeding and automatically controlled appliances 1 in.-1½ in. coke should be used when available and the fuel space should be filled as recommended by the maker. As coke is not so dense as anthracite or other smokeless fuels, the hopper or fuel space will require to be filled more frequently. Should the cooker not work satisfactorily the user is recommended to have it examined by an expert.

News in Brief

The Dublin Gas Company Players recently presented Oscar Wilde's "The Importance of Being Ernest," in the Company's theatre. The producer was Humphrey Langan. Proceeds were for the Mansion House Coal Fund.

The Directors of Falk Stadelmann and Co., Ltd., gave a luncheon to the office and warehouse staff on Dec. 23, to celebrate the opening of the new canteen which has recently been established at the head office, 91, Farringdon Road, E.C.1. Mr. Hugo Falk, the Chairman, presided.

Gas Consumption at Nottingham on Christmas Day reached 2,012,000 cu.ft. between noon and 1 p.m. and the week's consumption showed an increase of 12½%. Maximum pressure was given on Christmas Day, but inadequate mains were responsible for consumers in some outlying areas getting poor pressure.

Gainsborough's Century-old Gas Undertaking has started the new year by breaking all records of output. On Jan. 3 output exceeded one mill. cu.ft. and for the first week in January totalled six mill. cu.ft. Gas consumption in the town has been doubled since just before the war. Last winter the average daily output was 873,000 cu.ft. Extensions are contemplated to meet this ever-increasing consumption.

Seven Employees of Limerick Gas Department were each fined £1, and the summons against an eighth employee was dismissed, in Limerick District Court on charges of breaches of the Conspiracy and Protection of Property Act, through a lightning strike on Sept. 30. Mr. F. K. Thomas, Engineer and Manager, said that many thousands of citizens had suffered severe hardship and inconvenience because of the strike. Without calling evidence, the defending solicitor agreed that the situation which arose because of the strike was most serious. That situation, he said, had been negatived by the fact that the men had gone back to work, and that they had given an undertaking to the Minister for Local Government that they would never again strike unofficially. Negotiations were going on to have a proper set of rules and regulations drawn up between the parties. It was rather surprising, in view of a letter from the Mayor, stating that if certain things were done, which were in fact done, there would be no victimization, that these summonses, which were tantamount to victimization, should have been issued.

Total coal production during 1948 was 11,673,000 tons more than in 1947—an increase of 5.93%. Deep-mined production was 10,188,000 tons more—an increase of 5.45%; opencast was 1,485,000 tons more—an increase of 14.5%. Total production represented 98.78% of the target of 211 mill. tons.

The Trade Statistics for November, 1948, just issued by the Department of Industry and Commerce in Eire, show imports of 28,876 tons of gas coal, valued at £133,666, as against 3,968 tons, valued at £11,595, in November, 1947. This brings the total of these imports for the first eleven months of 1948 to 275,513 tons, valued at £1,223,960 compared with 103,162 tons, valued at £339,705, in the corresponding period of 1947.

The Authors of the two best of 2,157 suggestions made at Fort Dunlop last year have been presented with gold watches by the Technical Director, Mr. F. G. W. King. They were made by a foreman in the motor cover department—an idea about tyre building; and an operative in the fabric preparation department—who suggested how raw material might be saved. Awards of £2,082 10s. were been made for 1,352 of the suggestions received.

Stonehaven Town Council is to ask the local gas company if a supply of gas can be provided to heat the town's swimming pool. The pool, opened several years before the war, was the first open-air pool in Scotland to be heated. Since the war, however, heating has been discontinued, and the Council is now intending to resume the pre-war practice. A firm in the south has offered to service the boiler, but before accepting this offer, the Council will enquire about the possibility and price of a supply of gas.

Fife County Council has objected strongly to the holding of an inquiry into the siting of a new gas unit in Fife, under the control of Kirkcaldy Town Council, on the grounds that it gave the Council no chance to be properly represented. Kirkcaldy Town Council plans to build a new gas-works in the vicinity of Strathore Hospital and Sir Andrew Clow was appointed by the Ministry of Fuel to hold an inquiry. The Council's official protest says that due warning was not given, that due attention was not given to alternative proposals. They propose instead that the new gas-works should be located near the new Rothes Colliery, thus keeping it within the industrial belt.

MOVING IN

THE need for keeping the closest contact with the building schemes of councils and local undertakings during all their stages, from their first inception to the day when the tenant takes possession is too well known to require comment. Just how much ceaseless vigilance and hard work this entails can only be fully realized by those who are actively engaged in this important branch of any gas service.

The South Metropolitan Gas Company may claim to have had wide experience of this kind, and we were recently privileged to learn in some detail the methods they have devised in the light of this experience to ensure that every tenant shall not only be kept informed of the many advantages which a gas service offers, but also be provided with the fullest facilities for obtaining them. Competition is naturally keen, but the Company has never regarded this as anything other than a healthy and natural incentive to its best efforts; present day conditions make it conclusively evident that best quality equipment must be used.

An attractive display in the outer courtyard.

Work really begins as soon as the first intimations are received that a project is being considered, and steps are at once taken to get into touch with the appropriate architect. This first step is always to try to persuade the architect to employ gas and coke for standard water and space heating requirements. It is not always possible, however, for this standard equipment to be secured even where the architect himself favours gas. If the authority concerned direct otherwise the architect can but follow his instructions. It is also important at this stage to discuss the general lay-out of the mains in relation to the siting. This was brought home to the Company not so long ago when one block of flats was found to be sited over a 36 in. main. When the costs involved in diverting the main were made known the job had to be re-sited.

A constructional detail that can cause a great deal of trouble is the composition of flooring materials. Owing to the shortage of timber, increasing use is being made of jointless floor surfacing materials, which are laid on the solid structural floor in a soft state in the case of asphaltic types and in a damp state in the case of coloured concrete and magnesite compositions. A sharp watch has to be kept for these particular compositions as a number of them are issued under trade names which may not reveal that they are magnetic compositions, and therefore highly corrosive, particularly to iron and steel. The Company's Divisional Managers keep lists of all those encountered and when in doubt representatives can obtain the necessary information.

There are, of course, a thousand and one other points that arise as a building scheme progresses, but those already mentioned should serve to show how essential it is for the Company to come into the general plan at the very earliest date. We will now assume that the completion date is near and very soon tenants will be moving into their new homes. Here again the earliest information of the exact date is essential. Labours may have proved in vain if "Mrs. Smith" decides not to use the gas that has been laid on for her. Regular contact is maintained between the Company and the Council's letting authorities and in housing estates erected by the London County Council in South London it is the custom for one of the flats to be reserved as a letting office in which the gas and electrical undertakings rent a room each and provide office furniture and a selected range of appliances for the inspection of the new tenants.

As will be seen in the accompanying illustration, the South Metropolitan Gas Company also arranges an attractive display in the outer courtyard, which offers more space and convenience than a small room within the building. A team of about five Company's representatives is on the spot. Where gas refrigerators and water heaters are part of the standard equipment a lady demonstrator from the Company's Home Service Section follows up within a few days to explain the use of these appliances.

As a point of interest it should be pointed out that the estate pictured in the illustration was an all-electric site—that is to say that the tenants were provided with no standard gas equipment by the Council. Although electric rental charges were lower than similar gas charges, and included an electric kettle, gas cookers were installed in roughly 80% of the dwellings. These results are not achieved without very hard and enthusiastic work and it is very certainly true that the race is usually won by the competitor who gets off his mark first.

ELEMENTS OF COAL CHEMISTRY*

Dr. D. J. W. Kreulen is lecturer in fuel chemistry and technology in the University of Utrecht. His book is a second edition, completely re-written in English, of a book on the same subject published in 1935 and written in German—a fact of some significance. Its form is very largely that of a series of selected abstracts of previous work by workers of English, American, French, German, and other nationalities. Generally these abstracts appear to be ably and adequately criticized, but some of the chapters would have been improved by a summary of the author's conclusions. It is a book of somewhat limited appeal, perhaps only to advanced students of fuel technology and to specialists.

After an introduction and an account of systems of coal classification used in England, America, France, and Belgium, the author goes on to a discussion of the several theories of the formation of peat, brown coal, and bituminous coal which is as good as anything we have seen. His brief conclusion here is that as far as the factors are concerned that govern coal formation it is not so much a matter of that one *or* the other as of this one *and* another. "For nature, although logical and comprehensible in its details, often as a whole remains inimitable because of its complexity"—a remark with which not everyone will agree even if they understand it. Much of the book is given over to or coloured by the question of humic acids and humins. The chapter on carboniferous flora is short, good as far as it goes, but one would think with insufficient emphasis on the importance of pollen grains in the indentification of seams, though it is only fair to say that the author recognizes in a later section the important fact that these are largely resistant to change. Under the heading "Sub-division of a Coal Seam," Marie Stopes' four divisions are fully described and the importance of her work is fully recognized but one may doubt, not without some irritation, whether the change in spelling to vitrite, durite, fusite and clarite is "unanimously accepted by a great many workers"—at any rate in the country of their origin. The terminations -ite seem to indicate a definiteness of composition which is foreign to the original conception.

The petrography of coal is well illustrated and discussed. The chapter on the chemical properties of the several constitutents leads to another on volatile matter and coal character and yet another on the humic acid curve and its significance. It still remains true that: "What we are looking for is a constant narrowly related to the constitution of coal, thus specific for it, which also may be accepted as an index for some important technical property."

A treatment of the mechanism of coal oxidation leads to a chapter on spontaneous combustion and ignition temperature. The coking properties of coal are related to the presence of bitumens, which are studied in three short chapters covering extraction by solvents, and by "the fact the coal goes through a state of plasticity during coking." It is however recognized that in practice the coking properties are judged either by agglomerating (*i.e.*, the coke button swelling number) tests or by agglutinating tests, though the latter are apparently abandoned in some authoritative quarters. Methods of testing swelling under pressure are described. The book ends with a short chapter, seven pages, on coal hydrogenation.

The book is another example of the beautiful printing work which is done in Holland. The "English" is, of course, very good —for a Dutchman—but it is a pity that an English technological writer was not persuaded to give it a little sub-editing. Some sentences, perhaps not very important ones, are difficult to understand. But the book appears to be practically entirely free from printers' errors and mis-spellings.

* By Dr. D. J. W. Kreulen; Nijgh & van Ditmar, Rotterdam. pp. 204. 35s.

The Women's Gas Council will hold a Residential Conference on "The Home and Citizenship," at Harrogate, for all its members, on April 26-29. Delegates from other women's organizations will be welcome in so far as accommodation will allow.

NEW GAS-WORKS FOR BOLTON

ONE-MAN OBJECTION CAUSES ENQUIRY

An enquiry into the application by the Bolton Corporation for a Special Order under the Gas Undertakings Acts, 1920-1934, was held before Mr. G. W. Tookey at the Town Hall, Bolton, on Jan. 7.

Mr. **G. W. Dawtrey** (Deputy Town Clerk), who appeared for the Corporation, said that the Council had realized for some time that the demand for gas had been far outstripping the capacity of the present gas-works. They realized that it would be necessary to build a new works on a fresh site, made enquiries, selected a site of 40 acres in Union Road which was possibly the only suitable one in Bolton, and acquired it by agreement. On Nov. 26, 1947, the Town Council passed a resolution to approach the Minister of Fuel and Power for a Special Order to enable them to proceed with the erection of a gas-works on the new site. Notice of the intention was published and objections were received from Mr. John Robert Norris, from the Turton Urban District Council, and from another private objector.

In the case of the two latter objectors, both quickly withdrew when the nature of the proposed works was explained. Mr. Norris had maintained his objection, basing it on two grounds; that the property at 60, Pole Street, of which he was owner-occupier, would be adversely affected in value by the new gas-works, and that the amount of traffic in Pole Street would be very greatly increased and would constitute a danger to his three young children.

The New Look

It was the Corporation's submission that Mr. Norris's property would not be adversely affected at all. In the first place, the new works would not be a gas-works of the old type. The new building would be an extremely elegant structure and would not have any of the soot, smoke, grime, and smell associated with gas-works in the public mind. It would not be an eyesore at all and would not injure the amenities of the neighbourhood, which in any case was scheduled in the town planning proposals as an industrial zone. Even if the gas-works were to be of the old type, it would still be his submission that Mr. Norris's house, which was some considerable distance from the proposed works, would not be adversely affected. There were, in fact, some 200 houses nearer the proposed site than Mr. Norris's and it was "rather significant" that no objection had been received, with one exception, from the owners of those houses.

Regarding the second ground for the objection, the effect on the volume of traffic, police evidence would be called to say that in their opinion there would be no increase in the amount of traffic along Pole Street.

The first witness was Mr. **H. Platt,** Engineer and Manager of the Bolton Gas Department, who said that he had been employed by the Corporation since 1924 and had been Engineer and Manager since 1937. The site of the proposed gas-works was 40 acres and the intention was to build there a unit works. In the first stage it was intended to build a unit of 5 mill. cu.ft. per day capacity. He described the situation of the site and said that the intention was to build there a single gas-making centre instead of the present two and thus to ensure a continuous and adequate supply of gas, providing for future demand both from Bolton and from the nation. The site was convenient for access by road and rail for the works and was also convenient for the present distribution system.

At the moment, Mr. Platt continued, the supply of gas was not adequate for the Department's area of 60 sq. miles and there was great difficulty in meeting its obligations. The present sites were too congested to be developed further. The new works would be laid out as a fully developed gas-making plant on the most modern lines and using the latest gas engineering practice. When completed it should afford a striking example of a gas-works as now conceived. The roadways in the works would be 60 ft. wide, the central islands would be covered with vegetation, and they were aiming at preventing the emission of smoke, heat, or steam. Dust would be kept down by vacuum plant and smell would be confined. The main part of the building would be clothed in brick, designed by an architect, and so become a thing of beauty.

Amenities for Workpeople

Mr. Platt submitted a drawing of the finished works and said that all that issued from the chimneys would be burnt gas from the mechanical producers. There would be ample amenities for the workpeople with cricket pitches, bowling greens, recreation rooms, canteens, allotments, and they had a place for a swimming pool.

Answering questions from Mr. Tookey, Mr. Platt said that the old box method of purification might become outdated. There were two processes being developed which would prevent any smell. In the construction of purifiers as now conceived, it was possible to confine the smell and pass it through chimneys into the higher atmosphere. It was a matter of capital cost in the initial stages.

Mr. **Charles Herbert,** Borough Surveyor and Engineer, produced a plan showing the proposed site in relation to Mr. Norris's house at 60, Pole Street. On Jan. 6, 1920, he said, the Borough Council passed a resolution to prepare a planning scheme, the preparation of which was entrusted to the late Bolton and District Planning Committee. The material date for the scheme was Jan. 1, 1927, and the joint planning scheme was deposited with the Ministry of Health on Jan. 20, 1938. The area of which the new gas-works site formed a part had always been scheduled for industrial purposes and there was no doubt that in the development plan under the Town Planning Act, 1947, the area would be not scheduled for anything but industrial purposes.

Mr. Herbert gave details of the site and its proximity to the railway and a number of factories. Mr. Norris's house, he said, was 200 yds. from the proposed site and 400 yds. from where the nearest of the buildings would be. It could be quite impossible for Mr. Norris to see even the top of the retort house from his bedroom window. The erection of the new works would not in any way affect the value of the property.

Inspector **John Topping,** Bolton Traffic Inspector, gave evidence of a check kept on the traffic in Pole Street and expressed the view that the building of a gas-works would not increase the amount. When Mr. Norris objected that the amount of traffic going to the works would lead to a halt sign or traffic lights being erected at another approach to the site, and that drivers would then turn up Pole Street to avoid stopping, the Inspector said that a halt sign was possible, but not traffic lights.

Objector's Evidence

Mr. **Norris** called no witnesses, but made a statement to the enquiry in which he said that he was indirectly speaking for his neighbours—people who did not understand what their rights were and felt that if the Corporation decided to build a gas-works near their homes it was inevitable. Since hearing that a new gas-works might be built near his home, he had tried to sell or exchange the house, but though many people had been interested, they had decided against it when they heard about the new works. That was his answer to the Corporation when it said that the value of the house would be unchanged. Denying the Borough Surveyor's argument that he would be unable to see the works from his house, he claimed that the picture of the works shown to the enquiry would not be like the actual building. "You can go into a public house and see a picture of a brewery there," he said "but when you go to the brewery itself you find it nothing like the picture. It will be the same with the gas-works."

Mr. Tookey closed the enquiry after visiting the site of the proposed works and Mr. Norris's house.

GAS TRAINING FOR SCHOOL CHILDREN

It has been the practice in Birmingham for many years to arrange for cookery and laundry demonstrations to be given to senior school girls. During the past year this training has been extended and classes of girls from various schools have attended courses consisting of eight lecture-demonstrations, the programme being as follows: (1) Gas manufacture and distribution; (2) gas meters and meter reading; (3) gas cookers and thermostats (short demonstration and talk on use of cooker); (4) water heating; (5) cookery demonstration; (6) wash boiler and laundry demonstration; (7) space heating; (8) refrigeration and cold cookery demonstration.

At the close of the sessions, the students have written compositions on one or other of the subjects taken, and prizes have been awarded for the three best essays. Since January, 1948, between 300 and 400 girls have attended the courses in the Gas Department Demonstration Rooms, and have also had the opportunity of going round the showrooms to examine new appliances.

It is hoped to extend these facilities still further and headmasters are being invited to arrange for their boys to take advantage of this form of instruction. Certain alterations will, of course, have to be made to the syllabus, and it is hoped that practical gas fitting will be substituted for cookery and laundry demonstrations.

The Grey (Discussion) Editions of Communications Nos. 37/21 and 39/23 of the Gas Research Board are now available from the Board, price 2s. 6d. per copy (post free). The Grey Edition of Communication No. 314/135 of the Institution of Gas Engineers has also been published and is available from the Institution, price 2s. 6d. per copy.

HARDENING OF OXIDE IN PURIFIERS

Points from the Discussion on the Gas Research Board Interim Report on the subject—continued from p. 665 of the Journal of Dec. 22, 1948

MR. NORMAN HUDSON (Mirfield), part of whose comment we have already reported, continuing, said that hardening tendencies appeared to coincide with the appearance of sulphur in the voids of the oxide mass and a drop in moisture content to below 10%. They knew that H. B. Avery had indicated that during alternate sulphiding and oxidation the sulphur was deposited within an oxide particle, the iron oxide continually migrating so as to remain on the outside, and yet they were getting sulphur in the voids. The only explanation they could advance was volatilization of the sulphur and its recrystallization and deposition in the voids due to internal local heating—internal local heating in only a small part of the oxide mass at a time which would result in only a very slight increase in the temperature of the main gas stream.

They therefore decided that to prevent caking under their operating conditions they must endeavour to achieve such conditions in the oxide mass as would allow the heat of reaction to be dissipated. In this connexion they felt that two points must be borne in mind—namely :—

1. That the oxide mass should be charged with enough moisture, the evaporation of which would dissipate some part of the heat of reaction.
2. That the "voids velocity" of the gas should be above the critical value to give turbulance and dissipate heat in the gas stream.

Concerning 1 above, they found that if the oxide was "placed" in a purifier with an initial moisture content of 22/23% they could retain that purifier at work for 26 weeks without artificially adding moisture and with only mild caking and back pressure. Such oxide when removed contained 10/12% moisture. If they left such oxide in action another four weeks, the moisture content seemed to be reduced below a critical percentage of the mass and hardening and back pressure developed very quickly, the voids being filled with a material which was removed with a CS_2 wash.

Was it possible, therefore, that, although they knew that in most cases this problem was eased by using an oxide with an initial small range of particle size and an initial moisture content of at least 20%, it was really the parts these conditions played in dissipating heat from the oxide mass that was the essential effect?

Mr. **G. E. Currier** (Bradford) agreed with Mr. Avery that one of the contributing factors in recent years to the increased hardening of oxide had been the increased loading of purifiers. He did not think, however, that there would be such ready agreement with Mr. Avery as to the effect of reduced calorific value. While there might have been some reduction in calorific value in certain places, if the reduction in calorific value had been properly effected it should not have resulted in increased oxygen content. Coming to their experience at Bradford, he said that the general experience agreed with the findings and tendencies shown in the interim report. It was their general practice to work two layers of oxide per box with fixed downward flow, the bottom layer being filled invariably with previously unexposed oxide having a bulk density of 35 lb./cu.ft., the upper layer being partly spent material, neutralized with lime to a *p*H of 7.51, but without admixture with new oxide, and having a bulk density of about 50 lb./cu.ft. The total depth of oxide was 3 ft. 9 in., the boxes being worked for long periods at an R value of 30-35, with 24 hours' rotations to spent oxide in two exposures. Humidity and inlet temperature were increased by live steam as required. oxygen being admitted in one stage immediately at the purifier inlet. Some 12-18 months ago, cold detarrers were installed on the cool gas stream.

Local arrangements now required a moisture content of some 6-8% for sales oxide, and because of that the gas temperature was invariably higher at the outlet than at the inlet. The light oil deposited since the use of those detarrers was very small in quantity. Prior to their use, and when moisture content of sales oxide was relatively unimportant, very hard rubbery oxides were experienced. Tests taken of crushing strength of 6 in. cubes, with a view to setting a standard of hardness, gave an average result of 76 lb./sq.in., associated with bulk density of 70 lb./cu.ft., after a second exposure of some 9-10 months. Since the use of detarrers, in conjunction with reduced exposure time and a high and fairly constant R value, the spent material had been generally easily removable, the oxide being brittle and friable rather than rubbery. It was interesting that rarely, if ever, was hard oxide encountered in the bottom layer of the boxes.

Hand-filling with the minimum of drop was, in their experience at Bradford, preferable to mechanical-filling, but even with hand-filling there were small areas, particularly under galleries, where the bulk density was less, and it was in those areas in which hardening began, due, presumably, to an easier track and higher local reaction and temperatures. Uniformity of bulk density throughout the charge was of considerable importance, as well as basic bulk density. Some years ago, he said, a carburetted water gas oxide, having a high tar content, after removal from the box by shovel only, developed, after stocking, a tendency to fire. Quenching and the heat developed produced in conjunction with the tar a concrete-like mass, only removable by pneumatic spade. That seemed to indicate the influence of temperature, water content and tar oil on hardening.

In actual working it was found that high box temperatures, particularly with tar and tar oils present and with high moisture content, were conducive to hardening. That, so far as moisture content was concerned, appeared to be contrary to the report, but in their case high moisture contents had been associated with some of their hardest oxide. The use of excess lime in conditioning a partly-spent material had been noted to promote hardening. In that connexion, to prevent excessive box temperatures, some control of the inlet temperature might be necessary during high loading and under summer conditions. Where two or more sets of purifiers were available, it would seem that the best practice, particularly during light load periods, would be to work one set at the highest R value possible to obtain quick fouling and short exposure time. Hardening of oxide had never been experienced in carburetted water gas boxes, even with high tar content, the lower working temperatures due to reduced hydrogen sulphide content being probably the cause. He looked forward with considerable interest to a further report on this important subject.

Length of Exposure

Mr. **J. J. Veryard** (South Metropolitan Gas Company) remarked that it was stated in the report that from the information obtained so far no single dominant factor had emerged which determined whether an oxide caked or not. It was significant, however, that at all those works listed as experiencing severe caking the length of exposure of the oxide in the purifiers was over 10 months, whereas at those works experiencing medium or slight caking the length of exposure, with two exceptions, was less than six months. Nevertheless, on the basis of the data given it would be unwise, because of the many variables, to conclude that hardening would occur if a charge of oxide remained in a purifier for longer than a definite period.

Several years before the war the hardening of oxide was investigated in the laboratories of the South Metropolitan Gas Company, and they came to the conclusion that the cementing together of the oxide in primary purifiers was in fact a function of time, and they obtained evidence in support of that on their works. The evidence was afforded by the fact that at one of their works where purifiers had for some time been underloaded, they experienced quite hard oxide and pneumatic tools had to be used to break it up. Last year at that particular works half the carbonizing plant was under reconstruction, with the result that the average R ratio was only 17, and the average time that each oxide charge remained in the purifiers was seven months. Normally it was the practice in the South Metropolitan Gas Company to operate the purifiers at a high space velocity, and at the station visited by Dr. Dent the average R ratio in 1947 was 35, and the average time in the purifiers 2½ months. At that station the oxide could be removed quite easily by fork and shovel. Thus they had two works carbonizing the same coal, in the same type of carbonizing plant, the exhausters, condensers, washers, and scrubbers were identical, and both used the same purifying material, operated the purifiers in the same way, and produced spent oxide of very similar chemical composition. At one works, however, the oxide on the average stayed in the boxes over six months and was invariably hard; at the other station the average time in the boxes was less than three months and the charges were never hard. Thus they were convinced that general freedom from hardening in purifiers was due to the comparatively short period of exposure.

They were less sure of the mechanism of hardening. That temperature also had some influence was evident from the fact that in secondary purifiers, where the temperatures were lower than in the primaries, they experienced very little hardening, although the oxide remained untouched for several years. Normally no more than a trace of hydrogen sulphide had to be removed by those purifiers, and in consequence very little sulphur was deposited.

In the course of their investigations they made some attempt to measure the pressure that developed during the course of fouling, and as stated in the report, pressures of over 100 lb./sq. in. were recorded in a laboratory apparatus. The instantaneous application of pressures of that order to powdered spent oxide did not, however, produce a briquette anywhere near as strong as average hard lumps of oxide. Observations of the nature of

the sulphur present showed that at the temperatures prevailing in purifiers a gradual change occurred, and they formed the opinion that the hardening of oxide might be due to the cementing together of the oxide particles by crystalline sulphur formed under the combined influence of time and temperature.

Experience at Bournemouth

Mr. **L. F. Thorne** (Bournemouth) said that in Bournemouth they had a "ring-side seat" at Dr. Dent's experiments, which had given them an opportunity of appreciating some of the difficulties attending that research. One difficulty confronting the Gas Research Board was the lack of fundamental knowledge concerning the chemical and physical aspects involved. That would indicate that there were advantages to be obtained from research of a fundamental character on matters of day-to-day importance to the industry which at first glance would seem to be subjects for technical investigation only. As a matter of interest, had Dr. Dent considered the possible use of X-ray analysis in helping to elucidate some of the problems connected with purification?

Dr. Dent had emphasized throughout the report that many of the aspects of the caking of iron oxide and its prevention involved the time factor. For example, the report said: "The avoidance of long exposure of oxide in purifiers is important." "The crystallization of salts due to drying of the oxide is a result of long exposure." "The alternative wetting and drying of oxide during the cycle of operation requires time." "Polymerized material thickens with long time contact." "The production of sulphates is favoured by any condition which results in the accumulation of iron sulphide." "When oxide remains for a long period before discharge severe caking seems inevitable." All those and other aspects were inherent characteristics of static purification, and to effect a remedy by taking advantage of Dr. Dent's recommendations would involve the expenditure of considerable sums of money.

Certain prepared oxides had been observed, if stored for several months before use, to decrease appreciably in pH value with the simultaneous formation of suphates. There was no confirmation of this in the report. It was suggested that soluble salts might be formed in that way before the oxide was used for gas purification, and that that might be still another variable factor. It was interesting to note that certain undertakings found that the practice of adding lime to oxide increased the tendency to hardening. This confirmed their own experience. In one set of purifiers it had been found that almost straight-line correlation was obtained between the proportion of lime added and the life of the charge before hardening became excessive.

Investigations had been made into the question of polymerized bodies in spent oxide, and it appeared that a substance similar to ordinary vapour-phase gum was deposited in purifiers and that that substance could react with certain iron compounds in the oxide to form an iron-organic complex which contributed considerably to the caking of the oxide. It was interesting to note that a similar if not identical substance could be produced by the action of normal acetone-soluble vapour-phase gum on metallic iron.

The Time Factor

Returning to the time factor, at Bournemouth they were experimenting with a dynamic (as opposed to static) method of purification wherein the oxide was made to travel counter-flow to the gas, similar to the operation of a continuous vertical retort. Already they had obtained gas throughputs of 800 cu.ft./hr./sq. ft. of purifier area compared with about 20 cu.ft./hr. in orthodox static purifiers. The dynamic method of purification automatically obviated many of the factors which, according to Dr. Dent, influenced caking, particularly those due to the time factor. In addition, the alternate wetting and drying of the oxide was avoided, since conditions were always uniform; the advantage of an exceptionally high R ratio of 160 was obtained, and only one vessel was necessary, while the moisture content could be adjusted and controlled continuously so that it did not fall below 10%. One of the striking features of dynamic purification was that the activity of the oxide (per unit of Fe_2O_3) was maintained throughout its life and was not appreciably lowered even when the oxide was fully spent. In the light of this, Dr. Dent's views on sulphur deposition were particularly interesting.

It seemed that the incremental fouling which occurred in dynamic purification permitted a complete migration of the iron oxide, referred to in Avery's paper, and it might be that conditions were favourable to the oxide acting more catalytically than was possible in static purifiers. Alternatively, it might be that the short time contact which was used in the dynamic purifier resulted in the complete absence of polymerized bodies with their blanketing effect on the available iron oxide surface.

The purifier, which had a capacity of 500,000 cu.ft. per day or more, was still in the experimental stage, but already it seemed to offer the advantage of low capital cost, small ground space, absence of heavy manual labour, safeguard of purification in the event of intermittent mechanical failure, and complete freedom from the troubles in static purification which Dr: Dent and his colleagues were trying to diagnose and cure.

Mr. **John Bateman** (Sheffield) said the main purpose in avoiding hardening of oxide was to lighten the task of the men who had to discharge the boxes. In a recent check on similar boxes on different streams of gas, each box of 150 tons oxide capacity, he found that the time taken to discharge those boxes varied as follows:—

A (slightly caking)	96 man-hours
B (severely caking)	216 man-hours

Apart from the saving in time, the saving in physical exertion would be appreciated where slightly caking conditions prevailed.

In that connexion, he disagreed with the section of the report which placed special emphasis on hand-spreading of the charge and avoidance of disintegration as a means of reducing bulk density and thus reducing caking. He contended that charging a box from an overhead band-conveyor with travelling throw-off carriage and canvas chutes would produce an oxide layer at least as light as hand-spreading, and with infinitely less labour. There were other and more important causes for high bulk density—e.g., physical properties of oxide, moisture content, depth of layer, &c.

With regard to disintegrators, it would be a retrograde step to go back to the laborious hand-breaking of oxide, spreading out and turning over for revivification. If disintegrators increased the bulk density to unmanageable proportions, then surely the answer was to add a lightening agent. His experience was that, with the mechanization of oxide handling and a slightly caking oxide, there were no labour problems. The man was more than just the other end of a pick or a shovel and had a genuine interest in his job when mechanization was employed. In one installation at Sheffield with a total working capacity of 1,800 tons of oxide, in 12 years' operating there had not been one hold-up in box filling due to breakdown in the oxide handling plant.

After several years' experience of purifying ammonia-free coke oven gas, he found that, although lime was added to an oxide batch to give it a *p*H value of 8, when it was discharged the *p*H value had fallen to 4. How long did the oxide remain alkaline after charging into the box? If an alkaline condition was not essential, was ammonia admission necessary? From his experience of satisfactory operation of purifiers under those conditions, he would say that ammonia admission was an unnecessary evil, merely adding to the discomfort of the men who had to discharge the box. He could confirm the finding that alternate operation of purifiers with coal gas and carburetted water gas resulted in a severely caked oxide.

With regard to pressure troubles, he suggested that where those were encountered engineers should check up on the pressure loss through the purifier valving and pre-heating arrangements, as that might be considerable. Regarding the so-called blending of partly spent oxide with each fresh charge, he considered this to be a matter of expediency in order to get rid of an unavoidable surplus. He saw no reason why fresh oxide should not be charged and recharged until fully worked up if provision was made in the first instance to take up the increase in bulk.

A study of the report had already shown where improvements could be made in their own purification methods, and he was certain that, from the smallest works to the largest, improvements in purifying could be obtained by the practical interpretation and application of the information contained therein.

Electrical Detarring

Mr. **K. W. Francombe** (Whessoe, Ltd.) commented that a detarrer was situated immediately on the outlet of the exhausters and, as a result of the temperature rise through the exhausters, the gas was detarred at a somewhat higher temperature than would otherwise be desirable. The majority of electrostatic detarrers were, in fact, situated at the outlet of the exhausters, and there should be some justification for this choice of position. Clearly if there were secondary condensers the detarrer would naturally follow the secondary condensers, and that, in all probability, would be the point of lowest temperature of the gas, but if, as in many works, single-stage plate cooling was practised in condensers before the exhausters, then the position of the detarrer was almost invariably at the outlet of the exhausters, and the authors emphasized that in these circumstances the gases in the purifier should be re-heated to ensure that the outlet purifier temperature did not drop below the temperature at which the gas was being detarred.

There was another very good reason why, if a detarrer was installed on a works where there was only single stage cooling, it was better on the outlet than on the inlet of the exhausters. For example, let them take the case of some oven plant where turbo-exhausters were employed. High speed turbo-exhausters would extract between 90% and 95% of tar fog, and if the detarrer which followed them was able, as it was, to deal with the small remaining percentage of tar in the gas, then the extraction of tar would be complete. Then let them take the case of inlet turbo-exhausters dealing with 500 gr./100 cu.ft. of gas. That would normally correspond to an outlet turbo figure of, perhaps, 25 gr., perhaps even less. The detarrer would then proceed to do 99% extraction of the 25 gr., which meant to say they were left with only 0.25 gr. of tar in the gas. Had the order been reversed and

the detarrer preceded the turbo-exhauster, then clearly, although the detarrer would still have taken out 99%, it would be followed by a turbo-exhauster which, with the low tar content, would only take out a very small additional percentage, and the over all effect would be that the tar fog extraction was much smaller.

There was one other aspect which he would like to emphasize. The authors said that, despite electrostatic tar precipitation, in certain circumstances the tar content of the oxide in the purifiers was still high. They did not say whether they had tested the tar fog content, and he would not like it to be assumed that, because an electrostatic detarrer was put in, automatically complete tar fog extraction was thereby secured. It was not, of course. There were a number of reasons. The electro detarrer might not be working at a very high efficiency, or, even if it was, the actual tar fog content of the gas could still be high. For example, supposing they had a content of tar reaching the detarrer of 200 to 300 gr./100 cu.ft., and they still had that 99% extraction, they have 3 gr., and if the inlet temperatures were higher, 99% extraction might not, in certain circumstances, be sufficient to give a tar-free gas. There were other factors. The detarrer might be improperly maintained, or even improperly designed. There were a number of reasons why it did not axiomatically follow that if they had an electro-detarrer, the tar fog content was very low. He suggested to Dr. Dent and his colleagues that they should actually measure the tar fog content of the gas as well as merely indicating that an electro-detarrer was employed. He would not like the recommendation of a final oil washing before the purifiers merely to be a sort of bolstering up, in some instances, of an inefficient tar fog extraction system. If the system was efficient, and if there is no subsequent cooling of the gas, then one would imagine there was no reason why the content of unsaturated hydrocarbons should be reduced by oil washing, if naphthalene washing was not, in these circumstances, practised.

Active Oxides

Dr. **G. W. Anderson** (Gas Light and Coke Company) remarked that fear has been expressed as to what might happen when the oxide had been lightened so much so that the iron content had been reduced thereby. It was most extraordinary that oxides possessing a high proportion of active iron might not be the best performer because this active iron did not become available. He had examined a few hundred oxides and had found that the optimum efficiency of an oxide was reached when the concentration of active iron, expressed as Fe_2O_3 for convenience, was 9 or 10 lbs. per cu.ft. That gave an oxide with a bulk density of 30 or 35, which was not excessive, but in his experience does not necessarily produce a hard box if the purifying process was controlled properly with regard to temperature and moisture. The authors had emphasized these two points, but he would mention that nothing more than the control of the oxygen would help to preserve the correct conditions in the purifier. Allowing adequate time of contact between the gas and the oxide, 80% of the oxygen admitted to the purifiers would be taken out, so that there was no necessity for adding more air than 20% in excess of fouling. The gas entering the stream of the purifier should be free from oxygen, or substantially free, and the air should be admitted in the second box. This had a double effect. It kept down the maximum temperature rise because the reactions were separated, and it also ensured a more complete sulphidation of the oxide prior to the admission of air to the second box; 50% of the concentration of hydrogen could be removed in the first box and the hydrogen sulphide at the outlet of the first box could be kept within bounds.

Effect of Oil Condensate

Mr. **E. C. Evans** (Birmingham) said that if one was allowed to draw conclusions from the report, then initial charge density and the efficient removal of condensible hydrocarbons from the gas would seem to require closer study. There was, however, a strong belief in the industry that oxide hardening was a phenomenon of fairly recent origin. Whether the gas industry had become more conscious of its existence, due in general, to higher gas makes and increased labour difficulties, was hard to say; or was it that some change in practice had brought about conditions conducive to hardening and perhaps associated back pressure?

In Birmingham there was one works in particular at which the oxide suffered severe hardening, and high back pressures had developed in the coal gas purifier system. From evidence available prior to 1940, box discharging did not present any difficulties, and the oxide was readily fouled to 50% sulphur by single exposure. Pressure recorded prior to that date (due regard being paid to any differences in R value) confirmed the view that back pressures were much lower. To-day they were high and the oxide was excessively hard, double exposure and frequent digging over of the top layer being necessary. For many years the same brand of oxide had been in use and the box charging system had remained unaltered. The R value of the boxes had been on the high side, with a maximum of 35, and the gas cooling system somewhat overtaxed. The change in purifier performance (confirmed by back pressure records) appeared to coincide with the replacement of Livesey washers by electro-detarrers at inlet exhausters. No other changes in gas treatment took place during the period under review.

During the cold winter of 1946-47, difficulties were encountered due to extreme back pressures, and in the belief that tar fog might be responsible, special attention was paid to the operation of the electro-detarrers. It was during the inquiry that tests revealed the presence in the gas entering the purifiers of high concentrations of hydrocarbons condensible at 0° C—viz., 80-100 gr./100 cu.ft. Since that time it had been observed that considerable quantities of oil collected in the water valve seals and appeared in the box drainage during cold weather.

The effect of such oils from purifier drainage, or recovered by freezing from the gas, on the behaviour of oxide during fouling had been examined in the laboratory. Briefly, the results indicated that oxide (irrespective of brand or packing density), to which small quantities of oil had been previously added, when subjected to H_2S and air, alternately or concurrently, formed a hard cake. Under similar conditions of experiment oxide without preliminary treatment with oil did not cake. Many variables had been investigated, but the main issue was that the free sulphur must be present with the oil for hardening to occur.

It was stated in the report that the presence of light oil deposits in the purifiers might give rise to recrystallization of the deposited sulphur. The work in Birmingham confirmed that suggestion. The *modus operandi* was that the released sulphur dissolved in the oil film deposited on the oxide (solubility 3.4% by weight at 20° C. and 16.1% at 100° C.) and the film on saturation deposited larger sulphur crystals binding together the oxide particles. Frozen earth in which soil particles were cemented together by ice crystals would serve as a simile. The presence of free sulphur being necessary for oil to have that effect rather precluded the theory that the polymerization products of the oil provided the cementing agent.

With the laboratory-prepared samples it had been observed that oxide fouled in the presence of oil condensate lost its reactivity to H_2S and O_2 as determined by the Brückner method. The water-absorptive capacity was reduced, a factor which might give rise to back pressure in boxes in which excessive condensation occurred, and such conditions prevailed in the purifiers under review.

Of all the factors contributing to oxide hardening he believed that the presence of oil condensate in the purifiers played the most important part. It was difficult in the absence of data to attribute the excessive oil appearance to the installation of electro-detarrers. One suspected, however, that under certain conditions polymerization would take place in the electric field, and possibly gave rise to an increase in high boiling constituents in the gas. It was a subject worthy of further investigation.

HOSTEL FOR STANTON TRAINEES

To bring its training scheme within the reach of every boy in its works and quarries, the Stanton Ironworks Co., Ltd., Nottingham, is equipping a large house as a hostel where the boys can live under the care of an experienced warden and his wife while in training. The hostel opens on Jan. 3, when a group of boys from the Company's outside works will begin work at the Training Centre opened in June, 1947, at the principal works in Stanton.

While the hostel will give every boy in the Company equal opportunities, it is felt that they will also gain by the chance of community life with boys from other works.

The Stanton Ironworks Co. inaugurated its training scheme in 1918 and in the 30 ensuing years, hundreds of boys and girls have attended courses in technical and commercial subjects, aided by the payment of fees, travelling expenses, being allowed text-books at half cost, and rewarded by prizes for examination successes and good attendance.

Development of the scheme to meet the call for better-trained staff was started in 1944. Extended educational facilities were provided, based on a principle of part-time release for all junior employees. Co-operation with the local education authority resulted in day continuation classes at a technical institute being established. Attendance—one day a week paid for at the rate usual for their ordinary work—continues until the boys are 18 but those with special ability can continue their studies at a technical college in the hope of getting higher qualifications.

The third big step in the development of the scheme was in 1947 when a training centre at the Stanton works was opened, a well-equipped works in itself with foundry, pattern-shop, and engineering shop added to lecture room, classroom, and wash-room. The lecture-room and classroom are fitted for the projection of filmstrips and with epidiascopes, while the lecture-room houses a technical library.

All new entrants to the works of school-leaving age spend their first month in the training centre on an introductory course. Other courses include basic engineering training, training in special trades, and foundry training.

COMMERCIAL AND INDUSTRIAL UTILIZATION OF GAS—NO. 4

By F. DICKINSON, M.Inst.F.

(*Continued from page 158*)

GENERAL TYPES OF PROCESS APPLICATIONS

OWING to the extent of the permutations of furnace temperatures, types and functions, and the diversity and number of applications, it is difficult to classify them satisfactorily for easy reference in terms of either temperature range or applications. The latter alone are too extensive for a comprehensive survey in the limited scope of these articles, which must, therefore, confine themselves to a number of representative applications, with selected large scale applications to follow in greater detail. It is inevitable that a certain amount of overlapping in description should take place from one section to another as various aspects of technique of operations are examined from different angles, and the present intention is to start with the lesser commercial and industrial applications and develop into the larger ones, which will necessarily tend towards industrial uses.

General Range of Applications

Laboratories: Gas is used for bunsen burners, water distilling, hot water units, small open or muffle furnaces, and/or occasional specialized purposes.

Institutions, Hospitals, Colleges, &c.: Gas is used for heating hot water or steam, kitchen demands, laboratories, small independent space heating units, sterilizers, refrigerators, incinerators, laundry and other purposes.

Small Commercial Premises: The requirements here are diverse, covering heating, hot water and steam, small scale domestic cooking, trade cooking, tailors' irons, gluepots, and many other applications for gas.

Engineering Bench Work: Soldering bolt heaters, self-heating soldering bolts, tinning baths, torches using gas only, gas and air, oxy-gas, and oxy-ferrolene-gas, soft-flame torches for preheating, and a small furnace for tool hardening or odd heating jobs are typical gas applications.

General Utility Work: There is a field of occasional heating applications which falls between bench work and formal furnace work. Neither floor space nor demand could justify the installation of a number of furnaces of varying sizes for occasional jobs which, while important, are also infrequent. Nor is it practicable or economic to build a furnace of dimensions suitable for the odd large piece of work and use it for small work. In such instances it is necessary to give careful consideration to individual demands and cater for these with appropriate burner equipment which can be easily assembled as and when required, and dismantled after use. For running white-metal out of bearings a simple structure of firebricks can be used in conjunction with drilled bar burners and injectors or air/gas mixers. After tinning the brasses the molten new white-metal or similar alloy can be poured in from a gas-fired pot. Preheating of castings prior to welding, can be done in a simple firebrick structure with multi-section sides which can be removed local to the part to be welded, so retaining heat in the main body of the casting and preventing distortion due to excessive local thermal shock when welding. The shrinking-on of railway wheel tyres, crankpins and shafts, and linings of 16 in. gun barrels is in the same category, although the gun barrels require 60 ft. deep pits. All these, and many other such jobs, need careful and precise heat application as and when necessary. After this has been satisfied the floor space may be required for a long period, before repetition, for other work of relatively equal production importance. It is difficult to define any set piece of equipment for this work, for it varies so widely in size and application, but it can be met by natural-draught burners, bar-rails with Bray industrial jets, drilled bar-rails (straight, curved, or circular), individual mixture-burners of the pre-mix or the concentrated combustion type, and supplied with gas at normal pressure, air/gas from independent mixers, or air/gas from mixing machines.

Small and Medium General Engineering Works: There is usually plenty of scope for gas usage in factories of this type—*e.g.*, for office and works space heating, hot water and canteen requirements, core, mould, and ladle drying, non-ferrous metal melting, tool-room furnaces, maintenance shop equipment, and occasional furnaces for annealing or commutator drying, with a few box ovens for drying lacquer, &c., where necessary. Much depends on the type of product made, and in some works it is essential to incorporate heat treatment shops which may call for anything up to a dozen gas-fired furnace units of one type or another. For simple low carbon steel tools a small single chamber furnace with a heating range up to 950°C. will suffice, but for high carbon and special alloy high speed tool steels a double-chambered high temperature furnace is necessary. This is primarily because the final operating temperature may be of the order of 1,350°C., and secondly because it is essential to preheat such steel before insertion into the final chamber, to prevent excessive thermal shock to the article with resultant cracking or distortion. Other oven type furnaces may be required for normalizing or carburizing, also salt and cyanide pot furnaces.

Large Engineering Works: These demands are again called for on a larger scale, together with specialist heat processes such as the stress relieving of welded pressure vessels or fabricated structures, some of which require furnaces up to 16 ft. × 16 ft. × 50 ft. long, and large bogie annealing furnaces for castings or sheets.

Constructional Engineering Works: Fabricated steel structures provide scope for gas-fired rivet heaters oxy-coal-gas cutting and welding plant, portable burners for local heating work, bar and angle furnaces, and plate heating furnaces. The work is sometimes extended to sheet metal and jobbing galvanizing.

Shipyards: In both building and repairing yards there are frame and plate furnaces. The former are usually 3 ft.—4 ft. wide 55 ft.—90 ft. long. The latter can be 7 ft. 6 in. wide × 30 ft. long, and for certain work may be 14 ft. × 14 ft. With the development of welded construction there may be a falling-off in the use of plate furnaces. Both types are straightforward jobs for gasfiring, with demands of 8,000-20,000 cu. ft./hour. In some yards there are extensive oxy-coal gas cutting plants. There is also a considerable load to be met for pipe flanging, bending, and annealing, and in the engine and boiler shops there is the full range of general engineering heat usages.

The above gives a broad picture of utilization which could be considerably extended if space allowed. It would now be helpful to follow this with an indication of the working temperatures for typical heating operations, and then continue with a description of several useful process applications with consumptions in cubic feet of gas at 500 B.Th.U. calorific value.

Approximate Temperatures of Some Representative Heating Operations

°F.	°C.	Description
100	38	Smoking of meats.
300	149	Heating of calendar rolls, sweet boiling, tin lithography.
400	204	Frying of potato chips, melting solder, linseed oil boiling.
500	260	Bread and pie baking, oil tempering, core drying, varnish cooking.
630	327	Lead, babbit metal, and stereotype melting, tinning steel sheets.
752	400	Annealing aluminium.
860	450	Galvanizing.
932	500	Annealing copper and brass blanks.
1,380	752	Pouring temperature of aluminium.
1,500	816	Annealing high carbon steel.
1,600	871	Annealing malleable castings.
1,650	899	Annealing steel castings, rolled and forged carbon steel.
1,750	954	Carburizing.
1,900	1,038	Hardening carbon and alloy steels, rivet heating, bar heating.
1,950	1,110	Melting of brasses.
2,200	1,200	Copper and cast iron melting points. Gun metal pouring.
2,280	1,250	Forging.
2,550	1,400	Hard glass melting temperature.
2,642	1,450	Nickel content steel.
2,730	1,500	Refining of steel.

Approximate Heat Colours:

°C.	
450- 500	Faint red (observed in dark room).
500- 650	Blood red
650- 750	Medium cherry to full red.
750- 850	Bright red.
850- 900	Salmon.
900-1,100	Lemon to light yellow.
1,100-1,250	White.
1,250 upwards	Articles fade out in the colour glare.

There is no clear-cut line of demarcation between the designation of "degrees Fahrenheit" and "degrees Centigrade" in general operations. For hot water, central heating, cooking, and the heating of liquids it is usual to think in terms of degrees Fahrenheit up about 650°F. for lead alloys and 860°F. for galvanizing, but above this range temperatures are normally given in degrees Centigrade for general furnace work. It is often a custom of a particular trade to use one form of expression in preference to the other. As the operators think in such terms and their sense of proportion is appropriately adjusted, they are

often confused if the alternative terms are used, and it is advisable to talk to them in their own language.

It should be noted that the "pouring" temperatures of metals are higher than the melting temperatures to an extent dependent upon such factors as oxidizing or volatilizing temperatures of individual metals, allowance for drop in temperature between the source of melting and the mould, the type of mould employed. and the type of casting to be produced. For example, where some portions of a casting are required to be thin it is essential that the metal be hot enough when poured to fill completely the appropriate spaces in the mould before cooling and becoming sluggish in flow.

Liquid Heating Applications

Liquid or Solution Heating Tanks.

Gas-fired solution heating tanks are used for a variety of applications where fluids require to be heated to comparatively low temperatures. They are employed in garages and repair shops for heating cleaning solutions used for removing grease and dirt from motor-car parts and engine blocks, similarly in dipping and plating rooms and prior to putting other protective coatings on metals, also for oil tempering operations, pickling of metal parts, dyeing cloths, hair material, feathers, &c., in abattoirs for cleaning and boiling meats, and in small or medium bottle washing plants, &c. In most cases direct application of gas heating is more economical and convenient than steam heating, particularly in small works where space and labour are at a minimum and operations intermittent.

Dependent on the kinds of oils, grease, or foreign matter to be removed, the composition of the metal to be cleaned, its shape and size, and the operation to be performed on the article to be cleaned, the cleaning can be done by solution, chemical action, emulsification, or mechanical action. Solutions act by dissolving the oils from the work, the dissolved oil remaining suspended in the cleaner. They are mostly of an inflammable nature such as petrol, benzol, alcohol, turpentine, and tri-chlor-ethylene, and are not economical owing to their volatile nature. The last mentioned is mainly used for engineering processing, and tanks are fitted with water-cooled coils to cool and condense the warm rising vapour, which then falls back into the tank. Chemical cleaners combine with the saponifiable oils and grease or react with the metal itself. Caustic potash, caustic soda, potassium cyanide, and acids are commonly used. These act rapidly and must be in hot solution, but cannot handle mineral oils, which cannot be saponified. Emulsifiers combine physically with the materials to be removed, and are usually soap or soap compounds, phosphates, silicates, and other mineral salts. They do not give a chemically clean surface, but remove heavy coatings of grease and oil, requiring a final dip in another cleanser before the next operation. Mechanical cleansing can be done by chemical or emulsifying cleaners having an electric current passed through them to release hydrogen gas, or by cleaners incorporating floating abrasives. In all instances a warm or hot solution is necessary. Heat can be supplied by steam coils if steam is available, but the normal practice is now to use either bar burners or immersion heaters, both with automatic temperature controls.

Acid pickling baths for cleaning steel parts and removing rust and scale are in a different category. The solution may be sulphuric or hydrofluoric acid, which attack normal metals. Hence the tanks are usually made of wood lined with lead or special acid-proof bricks. Heating is normally done by blowing in steam, which also keeps the solution in constant circulation, but dilutes the mixture at a cumulative rate which is not economic. Very great care would have to be exercised in the selection of suitable gas heating equipment. Heating has been effected by special and expensive equipment, but could probably be carried out more simply by the use of hot air.

Galvanizing: In the past galvanizing has been carried out for the most part in baths having coke beds arranged around the sides, or in large baths by the flames and hot gases from a coal surface being drawn around the sides of the bath en route to a chimney. Owing to low selling prices and bitter competition in this trade it has only slowly moved towards gas firing, for the price of gas was considered prohibitive. It has now been proved that with automatically controlled gas-fired baths the fuel costs can be lower than with solid fuels, with anything up to double the output and better coating of materials due to the temperature of the spelter being rigidly maintained at the desired setting of 440°-450° C. The even and consistent distribution of heat to all relevant areas of the bath sides should also give longer bath life, but other factors enter into this, and no guarantee could be given. In one instance a large bath when producing at normal output rate over a checked period of total gas used for production and standby purposes against output showed an average of 10,000 cu.ft. of gas per ton dipped, and when extended this could reasonably be expected to be of the order of 8,000 cu.ft./ton. A medium sized bath showed a figure of 12,000 cu.ft./ton under similar conditions.

Special Liquid Heating Applications.

There arise in industry on occasions some heating problems where direct open-flame applications are not permissible owing to the inflammable nature of the materials to be heated, and the fire risk due to possible overflowing of such into the combustion chamber or on to any portion of the setting where ignition could be caused. To overcome this difficulty the Kestner Evaporator Co., Ltd., employ the Merrill system, which fundamentally consists of a boiler containing oil, placed in a safe fire-proof building adjacent to the process plant, with lagged hot-oil pipes led to an immersion coil in the material to be heated and returned to the boiler. Hot oil is circulated around this pipe system, and automatically controlled gas burners are used to ensure accurate control of oil and process material temperatures. The upper temperature limitation must be slightly below the point of carbon formation in the oil, and this is usually about 600° F., which is ample for dealing with varnishes and similar products requiring to be heated to 300°-500° F. An alternative to this is to employ the Dowtherm system, which is used in the same way, but with a special liquid, called Dowtherm, having the same temperature limitations. This is extensively used in America and is now becoming popular in this country.

Lead and Lead Alloys

Lead is used extensively in industry in the form of lead sheet and piping, moulded articles such as lead shot, battery grid plates, toys, governor weights, &c., protective coatings for cables, and for paint manufacture. It is usually melted in pots varying in capacity from 1 cwt. to 60 tons. The small hemispherical pots range from 1-5 cwt. capacity, and can be supplied with pouring spouts, or for ladling out. They are heated by multi-ring natural draught burners, melting at the rate of 3 lb./cu.ft. of gas. Small deep pots are used for heat treatment purposes between 700°-1,000° C.

The articles treated are usually hacksaw blades, reamers, broaches, files, &c. Natural draught or air-blast-burners are used, gas consumptions varying with size and output. For lead covering of cables a pot of 25 cwt. capacity can be used with a run-off of 600 lb. every 20 minutes, on a gas consumption of 450 cu.ft. per ton of lead on cables. The 60 ton pots are for melting scrap into ingots for re-melting later in smaller pots, and it is interesting to note that lead ingots mature with storage of not less than a three months' period, producing a better surface on the finished material.

The preparation of red lead is a special process. The plant consists of several shallow automatically controlled gas-fired lead baths grouped around a central chimney with fan eduction, pulling air over the surface of the lead and causing the formation of lead oxide or litharge. The powder is drawn away by the fans and discharged into the centre of a furnace where it is spread over the hearth by slowly rotating rakes, and calcined at about 650° C. The processed powder is withdrawn from this chamber and conveyed to two other such furnaces for further heat treatment to give the final purity required for incorporation in lead paint manufacture.

An interesting lead alloy is the type-metal used in newspaper and printing foundries for the casting of plates on which are impressed the typescript and pictures which appear finally in the newspaper and book pages. This metal has a melting point of 450° F., is usually worked between 550°-650° F., and has a composition as follows :—

Lead (Pb)	...	...	...	78-86%
Antimony (Sb)		...	...	12-20%
Tin (Sn)	...	...	...	3-10%

An average analysis is 78-16-6% and, while 10% tin is a maximum allowance, the greater the percentage of tin the finer is the impression and the smoother the surface of the plate. At 700° F. the tin burns out of the alloy, and as the replacement cost is very heavy it is considered vital not to exceed 650° F. at any time. The range of average pots used in the industry varies from 1 cwt. to 13 tons capacity, and while they were originally all plain pots from which the metal was ladled into the moulds, this has mainly been dropped in newspaper practice in favour of combined pots and moulds of the semi-automatic type for casting at the rate of two plates per minute per machine. Typical sizes, types and consumptions are given below :—

1. Small pots, 1-5 cwt. capacity.—Used in small printing offices for melting scrap metal into "slugs" for re-use, or where small quantities only are required and can easily be ladled out. Heated by multi-ring gas burners at 3 lb./cu.ft.

2. Circular "D" shaped pots, 10 cwt.-2½ tons capacity.—Used in printing works and smaller newspaper foundries where metal is ladled out. Heated by N.D. injector burners, or air/gas equipment of the type supplied by British Furnaces, Ltd., at 5 lb./cu.ft. A 2½ ton Hoe pot can be melted down in two hours from cold on 2,000 cu.ft. of gas, and cast two plates per minute on 850 cu.ft. gas/hour. The usual rate of casting from these pots is one per minute. Holding at 600° F. is done on 90 cu.ft./hour, with an N.D. burner.

3. Oval pots, 3½-13 tons.—Little used outside newspaper foundries, and usually in connexion with autoplate casting machines, as follows :—

(a) *3½ ton Pony Autoplate.*

Cold to metal down in 3 hours on 2,500 cu.ft. gas.
Hold on 120 cu.ft./hr.
Cast one plate/min. on 950 cu.ft./hr.
Cast two plates/min. on 1,050 cu.ft./hr.

(b) *5 ton Autoplate.*

Cold to metal down in 3 hours on 3,000 cu.ft. gas.
Hold on 150 cu.ft./hr.
Cast two plates/min. on 1,050 cu.ft./hr.

(c) *7½ ton Autoplate.*

Cold to metal down in 4 hours on 4,000 cu.ft. gas.
Hold on 180 cu.ft./hr.
Cast two plates/min. on 1,100 cu.ft./hr.

(d) *Winkler Autoplate.*

This is a smaller machine for fast casting work, and shows the highest casting weight per cu.ft. gas.

(e) *11 and 13 ton Autoplates.*

These are not often used, but are arranged to feed a Junior autoplate casting machine at each end.

The machine which appears to be most used in newspaper practice is the 7½ ton Junior autoplate, but this is essentially a matter of individual choice, and a 3½ ton Pony autoplate, a Winkler, Crabtree, or Foster autoplate may be more suitable for certain purposes. Plates vary in size and weight, but an average plate weighs about 80 lb. with tail and 56 lb. finished. The operation is intermittent, the metal being allowed to fall to 500°-520° F. during non-operating periods with burner equipment capable of lifting it to 620° F. in about ¼ hour, and holding this for 1½ hours when casting two plates/min. continuously. After the first run, casting is intermittent to meet the demand for additional plates, and is usually for about 20 minutes per hour for several hours until one edition of a newspaper has been completed, after which there is a long idling period until the cycle of operations is repeated. A brief summary of the weight of metal cast per cu.ft. gas is useful, and given below :—

3 lb./cu.ft. : Casting only from small pots.
5 lb./cu.ft. : Casting only from large pots.
7-8 lb./cu.ft. : Casting only from 7½ ton autoplate (newspaper work).
4 lb./cu.ft. : Casting only from 7½ ton autoplate (overall, including stand-by and initial heating up).
5.36 lb./cu.ft. : As above, but with Rabate system.
9-10 lb./cu.ft. : Casting only from Winkler autoplate.

Gas Engines

In covering the above applications and processes the description of those which will arise in later sections has been avoided, but before concluding this stage there is one gas application which is worthy of passing mention—*i.e.*, the gas engine. This prime mover was at one time fairly extensively used with both blast-furnace and town gas, but has gradually gone out of use due to the combined effects of the development of the electric grid supply and the comparative economies of operation. Some of the largest units in the world are the Cockerill blast-furnace gas engines at the Devonshire Works of the Staveley Coal and Iron Company, near Chesterfield, and these have been in continuous satisfactory operation for many years as electric power generating plants.

The normal large gas engine operating under good load conditions was not more than 26% efficient, consuming 20 cu.ft. of town gas per B.H.P. with a compression ratio of about 6.5 : 1.0, while small engines consumed up to 25 cu.ft. gas/B.H.P. As the price of gas for these power units was usually at a fairly high rate for industrial usage, an open field was left for competition from diesel engine and electrical prime movers, to the extent that the old-type gas engine is about as dead as the "dodo." Within the last few years, however, it has been found that gas can be successfully used with high-compression diesel type engines having compression ratios of the order of 13.5 : 1.0. Tests have shown that while the temperature of compression of the appropriate air/gas mixture at these high compressions is still insufficient to cause spontaneous ignition of this mixture, the addition of 10% of diesel oil will allow of this, with an efficiency of about 39%, and a gas consumption of 12½-13 cu.ft./B.H.P. Ignition can also be obtained with air/gas mixture by the use of a high-compression type of Bosch sparking plug, but the efficiency is slightly lower than with the oil/air-gas mixture. Bearing in mind the original gas engine efficiency of 26%, the fact that the Erren high pressure gas engine is about 33% efficient, and the diesel engine 35%, there appears to be a clear case for reconsideration of the employment of high compression gas engines for power and generation purposes, particularly as there is no call for special re-designing—a normal diesel engine unit can be used with the addition of a simple air/gas mixer on the air intake pipe.

An ingenious application of this has been made in America by having in tandem an electric motor, a gas engine, and a generator. The electric motor was driven from the mains supply, and used normally for starting purposes only, but in emergency for directly driving the generator. After starting up, the gas engine was put into operation and used throughout the working period at much lower cost than entailed by using direct electricity. In the event of temporary overloading of the gas engine the electric motor automatically came into operation, giving complete flexibility of operation at relatively lower costs with cover against breakdown of either driving unit.

Selection of Appropriate Furnaces

In nearly every manufacturing concern there comes a time when there is either a demand for a new or different heat process, or a review of existing heat processes and plant with a view to modernization. These are natural changes due to alterations in materials, modifications in specifications to meet new physical demands upon processed articles, entirely new processes, or a feeling that existing plant has had its day and that better plant must be available as a matter of normal development. This is rational reasoning on the part of engineers trained on production lines who realize that the day of "just a few firebricks, and a couple of gas burners will do the job at no cost" has gone, and has been replaced with the machine-tool furnace era. It is logical, too, that such men should realize their own limitations of knowledge in the field of furnace practice, and seek the advice of furnace experts. They are then faced with the problem of selecting the furnace makers who have specialized in the heat processes peculiar to their requirements and have carried such work well beyond the experimental stages; combined with a reluctance to invite enquiries from furnace firms until they have a clear picture in their own minds of the best alternative furnaces, equipment, and processes available. In these circumstances there must be considerable relief at the possibility of enlisting the advisory services of an industrial gas engineer capable of indicating the best type and size of furnaces for specific heating operations available at the time. The "time" qualification is essential in the light of the comparatively rapid evolution and development of modern furnace technique.

Before giving a considered opinion upon specific heating problems there are several aspects to be investigated. It has already been stated that an article may be satisfactorily heated to a desired temperature in several different types of furnace so that having been informed of the finality of processing which the customer wishes to attain, it becomes a matter of selective judgment, based on operating conditions and the consumer's preference, where such furnaces appear to be equally suitable for the required performance. One aspect is the quality desired in a finished article in relation to its mechanical functions. Another is production in terms of both the number of articles to be heated per unit of time and the weight to be heated per unit of time. For example, a variety of articles differing in size, weight, and treatment may automatically require a number of batch type furnaces, but a steady output of similar shaped articles treated within a limited temperature range would throw the balance in favour of a continuous type of furnace with the additional advantage of stock recuperation. In general terms the analyses of a customer's requirements for steel heat treating, given below, can be used as a guide for resolving the heat processing of a number of other metals and applications:

The following information should be ascertained:—

1. Type of heat treating operations (annealing, normalizing, hardening, tempering, cyaniding, carburizing, &c.).
2. Quality of product required—physical properties (surface condition such as scaling, decarburizing, clean hardening, &c.).
3. Type of product, sizes and shapes.
4. Quantity of product, especially quantities of material requiring the same or similar heat treatment.
5. Tonnage.
6. Diversity of production, with a view to staggering operations to allow one furnace to do more than one heating operation.

With the foregoing, or equivalent, relevant information to hand, it is then necessary to study the processes in detail, and having put forward a broad picture of the layout that appears to meet the required conditions in the most satisfactory way, to recommend one or more furnace makers who can meet these requirements. It then only remains a matter of tactful supervision of the installation and initial production stages to complete a very useful development of both gas load and consumer goodwill.

BIBLIOGRAPHY

Literature issued by the British Gas Council :

Catalogue No. 34. Gas in Industry.
Catalogue No. 30. Gas as a Fuel for the Light Metal Industries.
Catalogue No. 31. Gas Equipment for the Hairdresser.
Catalogue No. 35. Gas on the Farm.
Catalogue No. 38. Light on Industry.
Catalogue No. 39. Modern Gas Equipment for Laboratories.
Catalogue No. 174. Radiant Heat Drying by Gas.

In Christmas week there was an increase of 25 mill. cu.ft. in the consumption of gas in Glasgow, and in New Year week the increase was 34 mill. cu.ft. Bailie Samuel Leitch, sub-convener of the Gas Committee, told Glasgow Corporation this on Jan. 6. On Dec. 23 the Gas Department sent out a record day's delivery of 47.3 mill. cu.ft.

GOTHIC WORKS VISIT

Four hundred members of the Scottish Junior Gas Association (Western District) visited the Gothic Works, Falkirk, of R. & A. Main, Ltd., last month. The accompanying photographs were taken during the visit. Divided into small groups, the visitors were taken round the works and were shown the flow from raw materials to finished products.

Starting at the pattern shop, where they were shown various pattern and core assemblies and wood-block, tin, and aluminium patterns, they proceeded to the mould and core-making shops, where girls quickly made up the sand cores of burner and other castings. The visitors next saw the foundry, where molten metal is drawn off the furnaces to ladles which are run on mono-rail units to the bays where the moulds are waiting to receive the metal.

From the foundry the castings are taken into the fettling shop, where they are dressed and cleaned. Next the sand blast shop takes the casting, and delivers a spotless metal component ready for the enamelling process.

In the capstan shop, the visitors saw girls turning brass nozzles and screws. Next came the tool room, which showed the great range of equipment essential to the many processes carried on at the works. The visitors were given a demonstration of a new hydraulic press for deep pressings, and from this shop they passed to the pickling tanks where sheet metal is cleaned for enamelling. In the enamelling department, cast and sheet metal met and came under the same processes. The enamel is mixed in a milling room and ground and mixed to a controlled standard, ready for the spraying booths and dipping tanks. In the enamelling department itself, the parts are sprayed and hung on a chain conveyor which carries them through the drying oven. After fusing in an indirectly heated, gas-fired continuous oven, the parts are inspected and passed on to the assembly room.

After the visit, Mr. Aird, representing the Board, thanked the Juniors for their visit. Mr. Lewis Bain, the President, expressed the Juniors' appreciation for the Company's hospitality.

GAS UNDERTAKINGS' RESULTS

Commercial Gas Company

The Directors of the Commercial Gas Company at the Ordinary General Meeting on Mar. 3 will recommend the payment of a dividend of 2% for the half-year to Dec. 31, on the 4% Redeemable Preference stock, making 4% for the year (the same) and a final dividend of 2½% on the Ordinary stock, making with the interim dividend of 2½% a total of 5% for the year (the same), both less tax.

Blackpool Gas Department

In his report for the year ended Mar. 31, 1948, Mr. T. R. Cook, Engineer and Manager of the Blackpool Corporation Gas Department, states that gas sales amounted to 2,163,417,900 cu.ft., an increase of 2.89% over the previous year. Gross profit was £36,658, but after deducting loan charges of £38,682 there remained a net loss of £2,024. The balance of the appropriation account at Mar. 31, 1947, was £34,668, out of which was spent during the year a sum of £9,505, leaving £25,163 which, after deducting the net loss of £2,024, left a balance at Mar. 31, 1948, of £23,139. Of this amount it is proposed to allocate £3,405 for special expenditure and to carry forward £19,734. The net capital indebtedness at the end of the year was £550,461. Income from residual products amounted to £213,284, showing an increase of £44,488. Consumers totalled 45,321 (23,534 ordinary and 21,787 prepayment); during the year 502 new consumers were added; three ordinary changed to prepayment and 237 prepayment consumers changed to ordinary meters. Average consumption per consumer was 45,205 cu.ft. (62,718 cu.ft. through ordinary meters and 26,279 through prepayment meters). Since the opening of the showroom in 1929 the Department has sold 34,073 appliances to a total value of £375,481; for the past year the sales included 891 cookers, 201 fires, and 601 other appliances, worth £24,901. Many large cafes, hotels, and boarding houses were equipped with new and additional appliances, in some cases direct by the manufacturers. Expressing regret that the financial results showed a net loss of £2,024, Mr. Cook says: "This was beyond the control of the management, and it would appear that to submit an estimate of the working of the undertaking 13 months ahead is futile while the prices of coal and materials are on the upward trend, and the price of gas cannot be adjusted until months have passed after such increases obtain. Further increased costs are to be anticipated in 1948-49, and unless the price of gas can be increased to meet these costs the undertaking will be faced with a considerable loss at the end of the year." A reduction in gas sales during the current year is anticipated, due to the loss of gas used at Vickers' Squires Gate factory, which amounted last year to 130 mill. cu.ft., and which has now been closed down. While new industrial consumers will be connected to the mains, Mr. Cook estimates a reduction in output of 100 mill. cu.ft. during the year.

TRADE NEWS

Associated Lead

A 20 pp. brochure, with attractive art work and layout well studded with photographs published by the Associated Lead Manufacturers, Ltd., serves a threefold purpose: it explains why the title of the group has been changed; it sets a new-sounding company against its inherited background; and it tells how previous tradition will continue to live and flourish. Five of the eight Companies date back to the eighteenth century; the Cookson Lead and Antimony Co., Ltd., missing the seventeenth century by only four years. It is an interesting and readable book, its pages telling a story of worth-while achievement.

The Powers-Three Tabulator

Executives of those gas undertakings who are already using the Powers-Samas system and all who are aware of the advantages of the punched card method of accounting will be interested in the Powers-Three Tabulator—a new machine which Powers-Samas Accounting Machines (Sales), Ltd., have just introduced. This

new tabulator—the first post-war punched card tabulator to be made available—represents an attempt to bring the range of a much wider circle of prospective users.

The new Powers-Three Tabulator is of very attractive appearance and embodies the latest approved technique in office machine construction, particular attention have been given to ease and silence of operation. It has a capacity of 35 sectors consisting of one Numeralpha Unit of 25 sectors and one Numerical Adding Unit of 10 sectors with a maximum capacity of £999,999 19s. 11¾d. The Numeralpha Unit will print numerical and alphabetical designating information (including names and addresses) as desired, and the Numerical Unit will perform direct subtraction, giving the usual sub. and grand totals and net balances automatically by control at will over all 36 columns of the card.

We understand that one of the most attractive points about this new tabulator is its cost, which is considerably less than any of the 36-column tabulators hitherto available.

Full information can be obtained from Powers-Samas Accounting Machines (Sales), Ltd., Powers-Samas House, Holborn Bars, London, E.C.1.

Dunlop Conveyor Belting

The largest coil of conveyor belting yet produced at the Dunlop factory in Cambridge Street, Manchester, has been delivered to the Gas Light and Coke Company's Works at Beckton. Its dimensions are: length, 2,000 ft.; width, 30 in.; plies, five; duck, 28 oz.; rubber on face, $\frac{3}{16}$ in.; rubber on back, $\frac{1}{16}$ in.; weight, 6½ tons; diameter, 10 ft. 6 in. The rubber cover of $\frac{3}{16}$ in. on the face is specially designed to convey hot coke. Some of the Cambridge Street plant had to be adjusted because of the size of the coil before the belt could be completed. It will be used almost entirely for renewals on coke conveyors associated with the horizontal retort houses at Beckton, and some perhaps on the plant for conveying coal.

Vacuum Equipment

W. Edwards & Co. (London), Ltd., Lower Sydenham, S.E.26, have published two new catalogues describing vacuum equipment which should be of interest to those engaged in industrial or research applications of high vacuum technique. The first describes the Edwards 903A oil diffusion pump, which is a very high-speed oil diffusion pump utilizing silicone, apiezon oil, or other pump fluids in common use. Its several exceptional technical features are described and a speed curve is given. The second catalogue describes the Edwards Philips Type Model 3 gauge, a cold cathode ionization gauge which has become extremely popular since its introduction several years ago. All the new developments and features of the new model have been made by the Company's own instrument technicians.

GAS STOCKS AND SHARES

A fairly firm week is reported from the stock markets, though towards the end dealers were complaining of paucity of trading. British Funds had a reasonable turnover, but general conditions were much quieter than in some recent weeks, due to the political situation, although some encouragement was derived from the peace moves in China and Palestine. Markings for the week reached a total of 36,705, compared with 32,901 a month ago, and were at their highest for the week on Jan. 17 at 8,211.

In the industrial market, it was a firm week with the index kept by the *Financial Times* rising 0.6 to 122.7. Buying was very selective and there was little general dealing. Collieries attracted a little more attention than of late, but dealings in steel shares were negligible. News of the week included a statement giving the first broad outline for the reconstruction of Richard Crittall & Co., Ltd., providing for the continuation on a proper financial basis of the heating and ventilating business and for the liquidation or other disposal of certain subsidiary activities and businesses.

Dealings in gas shares totalled 194 for the week, giving a daily average of 38.8, the largest number of markings being on Jan. 17 when 48 were recorded. Price changes were small and few. Details are given in the accompanying table:

OFFICIAL LIST

Derby, cons., ord.	135	—140	+ 1
Gas Light and Coke, 3 p.c. con. deb.	86	— 89	+ ½
Tottenham, ord.	116	—121	+ 1
U. Kingdom Ltd., 4½ p.c. 1st cum. pref.	22/3	— 23/3	+ 3d.

The Blackheath Film Unit, Ltd., 9, North Street, Leatherhead, Surrey, has produced a new edition of its well-illustrated booklet describing its industrial film service. The booklet gives a full description of the origins of the unit, of the technicalities involved in making films and film-strips, and discusses different types of films.

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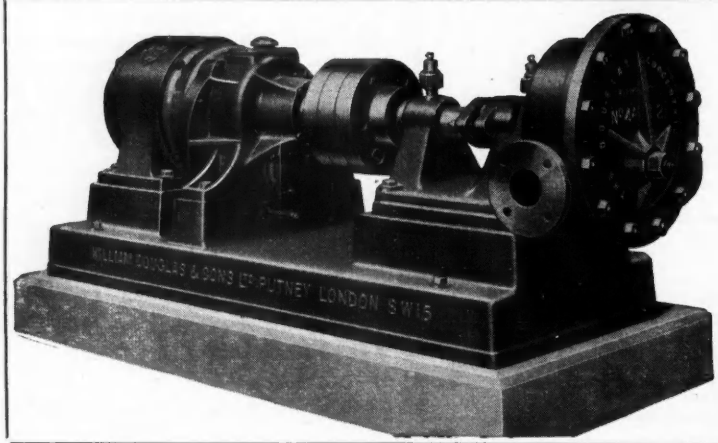

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